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Logistics Analysis to Improve Deployability (LOG-AID): Field Experiment/Results

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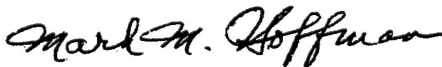
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FOR THE COMMANDER



MARK M. HOFFMAN
Deputy Chief
Deployment and Sustainment Division
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Executive Summary

The Air Force faces an ever-increasing requirement to support worldwide operations with shortened response times and fewer resources. The Expeditionary Air Force (EFX) concept establishes the objectives for meeting the increasingly stringent operational requirements. As a step towards meeting the EFX operational concept, the Air Force Research Laboratory Logistics Readiness Branch (AFRL/HESR) established the Logistics Analysis to Improve Deployability (LOG-AID) to analyze and streamline the wing-level deployment through process improvements and technologies implementation. With the improvements and technologies identified, the LOG-AID program focus transferred to quantifying the improvement benefits through an experiment and demonstration.

The LOG-AID program identified 18 Deployment Process Improvements (DPIs) and the development of three supporting software tools, and the concept definition of an additional tool. The LOG-AID program process improvement criteria were the following:

- Minimize the unnecessary processing duplications, reduces the resources required for deployment,
- Reduce information processing time,
- Reduce the time required to perform the deployment process,
- Reduce the number of augmentees required to support the deployment process, and
- Reduce the number of hours required of the augmentees.

For deploying personnel, these improvements translate into less waiting time, more time with their families, and more rested troops ready to hit the ground running upon arrival at the reception site. For cargo deployment, the improvements result in fewer pallets being built, and fewer intermediate moves within the process thus reducing possible damage. For augmentees, these improvements translate into fewer hours spent supporting the deployment, more time

performing their official duties, and less time maintaining the Resource Augmentation Duty (READY) program.

The information used to develop the improvement concepts was collected from 427 users at 23 sites throughout the Continental United States (CONUS), United States Air Force Europe (USAFE), and Pacific Command of the Air Force (PACAF). The analysis resulted in 18 DPIs and showed the need to develop software tools for data; storage, item location and tasking, and operational support analysis to implement some of the DPIs. These tools needed to cover functional areas such as operational logistics support, base beddown data, and use of WRM as a minimum. Figure 1 lists the DPIs, tools, performance criteria, and DPIs rankings provided by the users.

| Deployment Process DPIs | DPI Rank | |
|--|----------|--|
| INFORMATION SYSTEMS <ul style="list-style-type: none"> Implement highly integrated information systems across levels of command, across and within deployment and reception sites to include a task receipt-to-airlift-manifest information system. | 1 | <div> Supporting Tools <hr/> BCAT (Beddown Capability Analysis Tool) <hr/> UTC-DT (Unit Type Code - Design & Tailoring) <hr/> STEP (Survey Tool for Employment Planning) <hr/> EKB (Employment Knowledge Base) <hr/> </div> |
| PROCESS <ul style="list-style-type: none"> Optimize production and minimize inspection activities Adjust responsibilities and improve integration of units, Manpower, and Personnel Capitalize on cargo and personnel processing similarities Collect process status and effectiveness information using passive means Improve in-transit visibility Control tasking receipts into the base Reduce the number of coverage days included for initial deployment Better define the objective and criteria for UTC tailoring | 2 | |
| | 3 | |
| | 11 | |
| | 12 | |
| | 13 | |
| | 15 | |
| | 17 | |
| | 18 | |
| TRAINING <ul style="list-style-type: none"> Apply real-world training characteristics to exercises Maximize training benefits Include total process training Incorporate training and efficiency evaluation capability into LOG-AID system | 8 | |
| | 4 | |
| | 6 | <div> User Defined Deployment Performance Criteria <hr/> <ul style="list-style-type: none"> Deployment Footprint Resource Utilization Information Fusion Deployment Execution Time Flexibility Quality of Deploying Resources Deployment Cost </div> |
| POLICIES <ul style="list-style-type: none"> Provide the UDM capability to produce more deployment-ready personnel and cargo Develop deployment guides for each deployment position Refine the AFIs as necessary to best guide the deployment process | 10 | |
| | 9 | |
| | 7 | |
| PERSONNEL ISSUES <ul style="list-style-type: none"> Develop a process to encourage augmentees to participate in deployment Develop a process to encourage augmentees to be committed to real world contingencies to the same level as exercises | 14 | |
| | 16 | |

Figure 1. DPI and Tool Summary List

The experiment was to involve a coordinated effort among the Joint Chiefs of Staff/National Command Authority (JCS/NCA), Commander-In-Chief (CINC), Decimomanu Air Base (AB), Ramstein AB, Cannon Air Force Base (AFB), and Mt Home AFB. However, situations beyond control of the LOG-AID program, to include the Kosovo conflict and a walk-the-chalk exercise at Mt Home AFB, caused the cancellation of the LOG-AID field experiment.

As an alternate analysis approach, observations of Mt Home AFB's walk-the-chalk and simulation model analysis were used. For their walk-the-chalk, Mt Home AFB incorporated several DPIs that through observation provided insight into the potential benefit. For the simulation models, process performance information was collected from visited sites, with specific performance information collected at Mt Home AFB. Aggregating the performance information across bases provided the basis for a generic Air Force As-Is wing-level deployment process simulation while using the Mt Home AFB performance information provided a base-specific As-Is wing-level deployment process simulation. Estimates of DPI and tool improvement potentials provided the basis for To-Be wing-level deployment process simulation models for both the Air Force generic and the base specific representations.

While not performing the field experiment minimized the analysis opportunities, Table 1 summarizes some of the benefits identified through the observation and analysis approach.

Table 1. Deployment Process Improvement Summary

| IMPROVED PROCESSING AREA | ESTIMATED IMPROVEMENT (Generic Air Force Perspective) | ESTIMATED IMPROVEMENT (Mt Home AFB Specific) |
|--|--|---|
| Coordinate Force Requirements | 33% | 33% |
| Deployment Schedule of Events (DSOE) Generation | 50% | 50% |
| Cargo Preparation | 25% | 11% |
| Cargo Deployment Facility (CDF) Processing | 90% | 23% |
| Personnel Preparation | 90% | 90% |
| Personnel Deployment Facility (PDF) Processing | 75% | 75% |
| Augmentee Support | 33 - 50% | Undetermined |
| First Chalk Completion | 9 - 20% | 20% |
| Sixth Chalk Completion | 11 - 20% | 20% |

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1 INTRODUCTION

Today's military operational environment dictates our armed forces reduce respond time to world crises. Under sponsorship of the Air Force Research Laboratory Logistics Readiness Branch (AFRL/HESR), the Synergy team analyzed the current wing-level deployment process as part of the Logistics Analysis to Improve Deployability (LOG-AID) program. The analysis resulted in the identification of Deployment Process Improvements (DPIs) and software tools directed at increasing the operational effectiveness of the Air Force's (AF) wing-level deployment process. The DPIs and supporting tools provided the foundation for developing the requirements for a streamlined process, providing the capabilities to reduce the deployment footprint, reducing deployment response time, and improving the use of deployment resources.

The scope of the wing-level deployment process considered for the LOG-AID program starts with the receipt of the deployment tasking and finishes with the deploying resources loaded on the transporting conveyance. Within this scope are included all information and activity processing. The activities include those by the battle staff, load planners, Deployment Control Center (DCC), Installation Deployment Officer (IDO), Unit Deployment Manager (UDM), in-check personnel, on-base transportation, Cargo Deployment Facility (CDF), Personnel Deployment Facility (PDF), marshaling team, load master, and load team.

Successful performance of the LOG-AID program required the application of a stakeholder-focused methodology based on the development and analysis of As-Is and To-Be models representing the deployment process. The information used to develop the As-Is models came from reviews of literature and previous programs, and from site visits. During the visits, the LOG-AID team observed deployment operations and interviewed personnel or stakeholders directly involved with deployment performance, being deployed, and evaluating the deployment.

Organization of the collected information into a set of As-Is models formed the primary analysis tools for identifying processing strengths and weaknesses. DPIs were developed to build upon the strengths and address the weaknesses of the current processes and then to be used to produce the stepping stones for the streamlining and improving the process as documented in a set of To-Be models, including potential technologies to implement the improved process. Extracting the processing requirements from the To-Be models produced the LOG-AID Concept

of Operation (CONOP). This report summarizes the LOG-AID Phase I effort that resulted in the improvement concepts and presents the benefit potential from the improved wing-level deployment process.

1.1 LOG-AID Overview

The LOG-AID program was designed as a two-phased effort as represented in Figure 2. Phase I focused on understanding and documenting the current wing-level deployment process, analyzing the process to identify strengths and weaknesses, and developing an improved processing concept supported by a set of software tools. Phase I resulted in the identification of 18 DPIs, the concept development of five tools of which four are currently being developed, and the process description concept for the improved process.

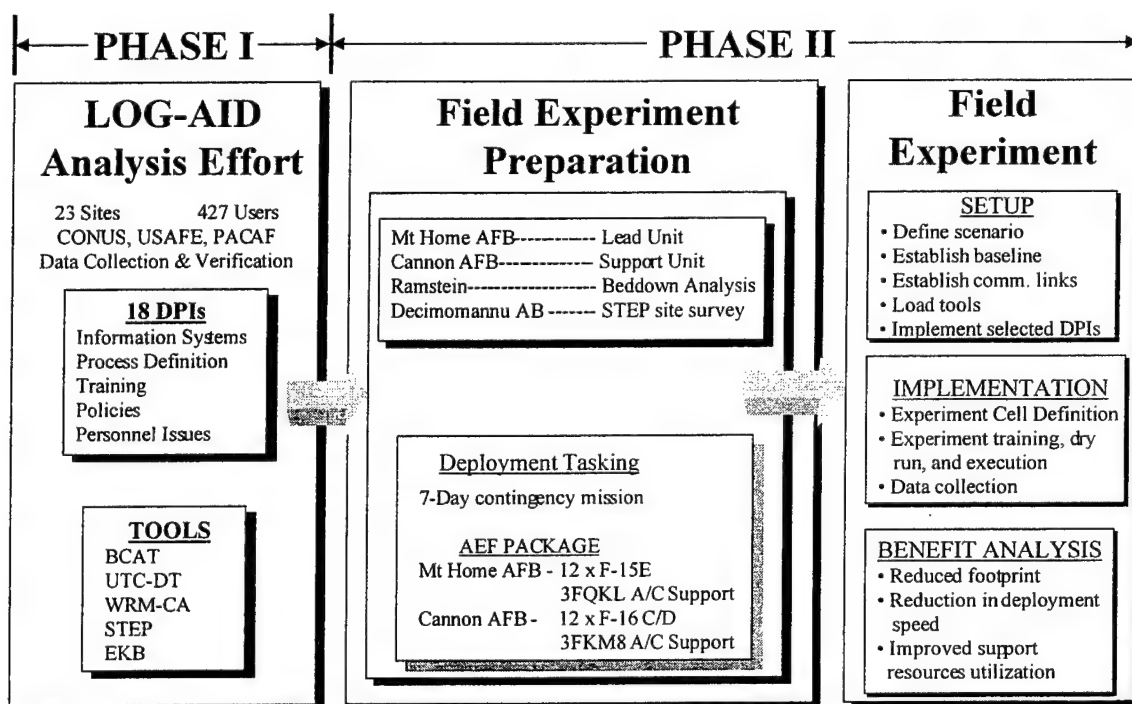


Figure 2. LOG-AID Overview

The information used to identify the DPIs came from the interviewing of 427 users at 23 sites throughout the CONUS, USAFE, and PACAF, and observing deployment operations, and analyzing current USAF guidance documents. As part of the information collection process,

USAF deployment experts verified our understanding of the deployment process and the DPIs as they were identified and documented. Using a rating methodology, the users ranked the DPIs to provide guidance as to which improvement concepts would provide the most benefits, with the DPI ranking results included in Table 5.

The established DPIs provided the foundation for developing the To-Be deployment process concept that built upon the strengths and corrected the weaknesses. Finally, As-Is and To-Be simulation models were developed to estimate the impact of the improvements based on a generic Air Force description of the wing-level deployment process. The generic As-Is simulation information came from aggregating performance information collected from the visited sites. Information for the generic To-Be simulation came from estimates of the improvements resulting from the individual DPIs and tool implementation. A comparison between the As-Is and To-Be simulations provided an estimate of the improvement potential.

Phase II focused on taking the Phase I results into a field experiment to evaluate the improvement potential using a more realistic operational environment. The factors for the benefit analysis included the factors of reduced deployment footprint, reduced deployment time, and improved use of deployment support resources, especially the augmentee workforce.

However, due to circumstances beyond the control of the LOG-AID program, the field experiment was cancelled. The circumstances included the Kosovo conflict, which eliminated the planned interactions among bases to test communication links and the collaborative use of tools for tailoring the Unit Type Codes (UTCs). Also, the decision by Mt Home AFB to perform a "walk-the-chalk" exercise resulted in conflicting requirements and goals with the field experiment, thus preventing the implementation of the field experiment.

Due to the above conflicts and situations, the Government program manager made the call to change from an interactive experiment to an observation evaluation of the LOG-AID improvement concepts. Observing the impact of process changes implemented in the Mt Home AFB walk-the-chalk, and overlaying this data with the simulation models to estimate the improvement potentials accomplished this. In addition, the new technology tools and concepts

were demonstrated to Mt Home AFB and Air Staff personnel as a way of collecting user perspective information.

1.1.1 DPI Description

Table 2 summarizes the 18 DPIs identified during the LOG-AID Phase I effort, with full descriptions presented in Appendix B. The shaded DPIs in the table identify those addressed in the walk-the-chalk and analysis.

Table 2. DPIs from the LOG-AID Program

| CATEGORIES | DPIs |
|---------------------|--|
| Information Systems | <p>1. Implement highly integrated information systems across levels of command, across and within deployment and reception sites to include a task receipt-to-airlift-manifest information system (i.e., Apply an information processing system that links and transfers information throughout the wing-level deployment process and provides decision suggestions to the deployment personnel.)</p> |
| Process | <p>2. Maximize production and minimize inspection activities (i.e., Improve Cargo/Personnel preparation so that pre in-check, in-check, marshaling check, and most PDF stations can be reduced or removed.)</p> <p>3. Adjust responsibilities and improve integration of units, Manpower, and Personnel (i.e., Improve the information exchange to provide the units with up-to-date, accurate personnel information.)</p> <p>4. Capitalize on cargo and personnel processing similarities (i.e., Develop a single information system that documents both cargo and personnel information.)</p> <p>5. Collect process status and effectiveness information using passive means (i.e., Reduce the need for deployment personnel to manually report to the DCC and to collect and analyze processing information for continuous processing improvement.)</p> <p>6. Improve in-transit visibility (i.e., Provide the capability to know where deploying resources are at any point in time during the deployment and to the beginning of employment.)</p> <p>7. Control tasking receipts into the base (i.e., Have everyone work to the same set of mission requirements.)</p> <p>8. Reduce the number of coverage days included for initial deployment (i.e., Considering the goals of lean logistics, shorten the number of days for which the number of days before sustainment begins.)</p> <p>9. Better define the objective and criteria for UTC tailoring (i.e., Establish a common understanding among units that UTC tailoring should be done so as to best satisfy the mission requirements.)</p> |
| Training | <p>10. Apply real-world training characteristics to exercises (i.e., Training for fragmented and full UTC requirement.)</p> <p>11. Maximize training benefits (i.e., Tracking of UDM and deployment support personnel training as they transfer among bases.)</p> <p>12. Include total process training (i.e., Provide general total process training in addition to the current focused training.)</p> |

| CATEGORIES | DPIs |
|------------------|--|
| | 13. Incorporate training and efficiency evaluation capability into LOG-AID system (i.e., Embed training sessions into the tools used for deployment and evaluate augmentee efficiency from these sessions.) |
| Policy | 14. Provide the UDM capability to produce more deployment-ready personnel and cargo (i.e., With the UDM being the key person with respect to streamlining the deployment process, it should be viewed as a specialized skill.) 15. Develop deployment guides for each deployment position (i.e., Document deployment position information such as detailed instructions, phone numbers for points of contacts, reference pictures, etc.) 16. Refine the Air Force Instructions (AFIs) as necessary to best guide the deployment process (i.e., The AFIs should be developed to document and control the agreed upon streamlined deployment process.) |
| Personnel Issues | 17. Develop a process to encourage augmentees to participate in deployments (i.e., Develop a reward system that will benefit those working as augmentees.) 18. Develop a process to encourage augmentees to be committed to real world contingencies to the same level as exercises. (i.e., Ensure the Base leadership monitors and measures the effectiveness of real world deployments in a manner encouraging augmentees to work to their true potential.) |

1.1.2 Tools

The tools designed and developed to support the implementation of some of the DPIs are the following:

STEP (Survey Tool Employment Planning) is a software/hardware tool that supports the rapid, yet thorough, identification of assets at a deployment base location. In simplest terms, STEP provides a medium for collecting in a multimedia type format, site survey information that documents infrastructure, resources, and capabilities information for potential beddown locations.

EKB (Employment Knowledge Base) is the information database holding the site survey information collected using STEP and supports the rapid transfer of data for planning of deployment/ employment requirements for contingency operations.

BCAT (Beddown Capability Assessment Tool) is a software program that aids a planner in the identification of reception base capabilities and TPFDD capabilities to support a given scenario. BCAT uses a partial rule-based approach to allow the planner to adjust the

planning factors for a given scenario. Not every element of the assessment is rule-based, and the software will only recognize specific types of rules for each area. This approach maximizes flexibility in assessing capabilities while minimizing the number of parameters that users must enter. BCAT deals with a large amount of related information. The key groups of information used by BCAT are the TPFDD, CAS data, ATO data, the assessment database, and the knowledge base (rules). The user has complete control over the assessment database, limited control over the knowledge base, and no direct control over the site survey data or the LOGCAT database files.

UTC-DT (Unit Type Code – Deployment and Tailoring) is a demonstration software tool used by unit-level deployment planners. Planners use UTC-DT either in a collaboration mode or standalone to analyze equipment for a specific operational scenario and identify quantities needed to accomplish the mission. Information considered within the UTC-DT analysis includes operational mission requirements, deployment site conditions and shortfalls identified by the BCAT assessments.

Bar Coding/Scanner – Technologies used to enter cargo and personnel information into information systems quickly and accurately. With bar codes attached to the cargo items and increments, the Palm Pilots will scan the codes and record which items are placed on which increments. For the bar codes on the personnel identification cards, the Palm Pilot will scan the cards to record those individuals deploying and relate the names to the database containing information currently maintained in the personnel folders.

1.1.3 Wing-Level Deployment Process Changes

Analysis of the current wing-level deployment process started by understanding the process goal and followed by an understanding of the individual steps and flow through the activities used to accomplish the goal. Using the DPIs, models, observations, collected data, and user suggestions, the current process was analyzed and revised to result in a process containing only efficient product oriented activities with minimized effort duplication.

Figure 3 and Figure 4 present top-level descriptions of the current wing-level deployment process and the deployment CONOP, respectively. The major differences between the As-Is and

To-Be process concepts are the removal of non-value added activities, the reduced use or quality check activities, reduced processing time through the application of equipment handling capabilities, and elimination or reduction of information processing activities through the use of automation.

As represented in Figure 3, the flow of current deployment process starts with a tasking identifying the force requirements necessary to satisfy mission objectives, which arrive independently at both the wing and Transportation Command (TRANSCOM). Using standard UTC information, TRANSCOM computes transport and airflow requirements, which they then provide to the deploying units. In parallel, the assigned force requirements trigger the wing to initiate their deployment activities by producing a Deployment Schedule of Events (DSOE). The DSOE development includes a two-stage process. First, the schedule represents a set of integrated task duration that reflects the deployment process timeline needed to deploy the wing. Second, using the assigned airflow's defined by TRANSCOM action times are computed to replace the time duration representations. Because the two levels of planning are performed in parallel, adjustments are made to the deployment timeline to accommodate the airflow times and to adjust to the assignment of aircraft type different from initially anticipated.

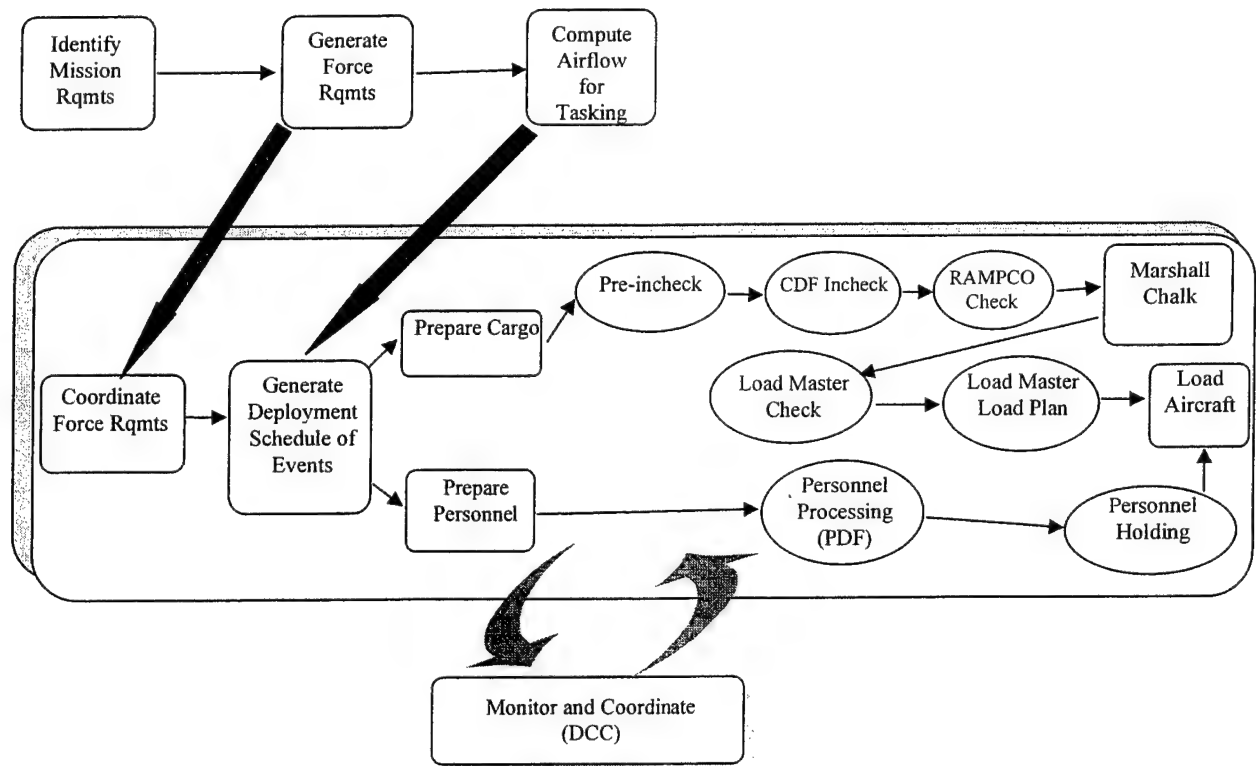


Figure 3. As-Is Deployment Process Overview

Once developed, the DSOE provides the official guidance and timeline for performing the deployment effort to satisfy the delivery of the required forces. In accordance with airlift availability and mission requirements the units select and tailor equipment and Air Force Specialty Codes (AFSCs), the units then develop a DSOE schedule to prepare their cargo and personnel for deployment. Upon preparation completion, the cargo moves by forklifts and flatbed trucks through a series of handling and inspection activities. As various steps are completed in the deployment process, phone calls to the DCC provide status updates. While the number and type of inspections vary somewhat from site-to-site, the general inspections for cargo include a pre in-check, a CDF in-check, a marshaling check, and a load master check prior to actual loading. For personnel, the general inspection includes a unit check, a PDF check and a loading check prior to actual loading. In addition to the checks, personnel often wait in the PDF for long periods prior to loading.

From the marshaling area the cargo increments are moved to and loaded into the aircraft. This process occurs in a number of ways depending on the type of increments and the availability of

Material Handling Equipment (MHE). Rolling stock may move to the aircraft under its own power, moved via a k-loader, or placed on a pallet and moved by a k-loader. For example, rolling stock, such as a C-10 air conditioner will likely be towed to the aircraft then pushed, pulled, or wrenched aboard. The majority of pallets are loaded onto a k-loader in the marshaling area using forklifts, and the k-loader then transports the increments to the aircraft and supports the increment transfer into the aircraft.

The proposed To-Be process flow, as illustrated in Figure 4, streamlines this process from the perspectives of both information processing, and resource (personnel and cargo) preparation and loading.

As currently accomplished, the force requirements continue to be received in parallel by both the wing and TRANSCOM. However, through the streamlining of the deployment planning operation, the deploying units define, coordinate, and communicate their deployment requirements to TRANSCOM in a timely manner so as to impact TRANSCOM's assignment of transports.

This improved information processing addresses all aspects of deployment planning. The aspects include the tailoring of resources through the integration of site survey information, coordination of deploying resources across units going to the same reception site, and tailoring of UTC resources based on previous experience and assets available in the deployed Area of Responsibility (AOR). The planning will also support the selection of personnel and equipment to fill the deployment requirements, the development of an integrated DSOE, and the status tracking and problem identification during the deployment.

The streamlined deployment process changes the operational focus of the DCC. Current DCC operations focus on coordination and correction based in many cases on erroneous and untimely information. The streamlined process minimizes the need for manual coordination, reduces the need for corrective actions based on, and identifies opportunities for adjusting the deployment processing timeline based on the continuously updated status information. Thus, many of the physical aspects of the DCC will be adjusted to place less significance on the DCC and more on the deployment process.

The design of the DCC also changes to provide more direct awareness of the deployment operations. These require that the DCC be capable of directly observing the holding and loading area, and preferably to allow the DCC personnel to videotape what is happening with the deployment process. This allows personnel to review the deployment to find out what went wrong, and how it can be handled better in the future.

Moving away from the information process aspects to the actual preparation and handling of the material and personnel processing for the To-Be environment as represented in Figure 4. The preparation begins with greater emphasis on keeping the deploying resources (both personnel and equipment) in a deployment ready state. In accordance with the deployment tasking, units make the limited number of preparation adjustments required.

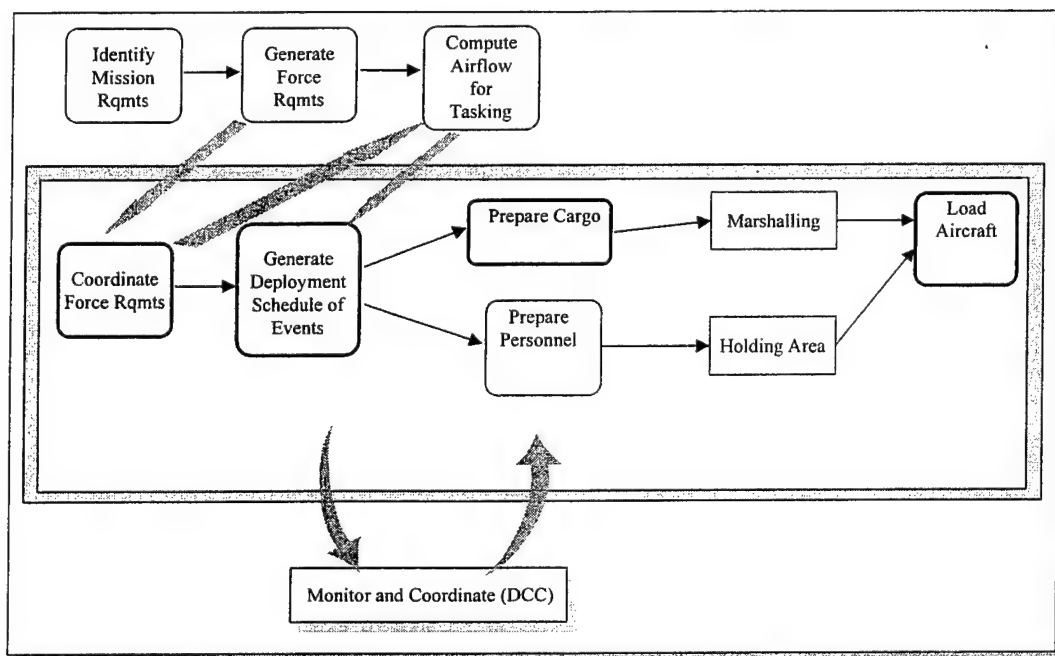


Figure 4. To-Be Deployment Process Overview

Using the improved technology capabilities provided to them, units prepare their resources to such a quality state that allows for a majority of the deploying resources to move directly from the unit to the aircraft. To ensure flight safety, a limited number of resources receive a Quality Assurance (QA) check prior to loading. For personnel, this check will correct any deployment default already identified. For equipment, this check will continue for increments with Hazardous Materials (HAZMAT), increments prepared by units with history of bad preparation,

increments containing items from multiple units and increments selected at random to maintain continued flight safety.

The actual movement of increments will be completed by effectively utilizing existing and new technologies. Through the increased movement speed, the goal will be to move increments from the units to the aircraft, while leaving open the possible need for a short-term holding area. Moving increments more effectively requires that k-loaders and forklifts be used primarily for short distance moves while other technologies, such as pallet dollies, provide a faster long-distance movement capability.

The To-Be deployment includes a feedback step to airflow planning for projecting more realistically airlift requirements. Providing this feedback for airlift comes through the use of tailoring support tools and the use of improved site survey information to more quickly determine the resource deployment requirements. This reduces the need for TRANSCOM to compute airlift based solely on standard UTC definitions.

The To-Be process also eliminates or at least reduces the need for a CDF and PDF. Units are empowered to provide accurate increment builds, thereby eliminating the need for redundant inspections. The same reasoning holds true for personnel processing, in that units are empowered to ensure their personnel are ready for deployment without going through processing stations for last minute corrections or additions. Several other steps have been removed from the current deployment process that represents additional inspection of cargo.

1.2 Planned LOG-AID Experiment

While LOG-AID Phase I documented and analyzed the wing-level deployment process to produce the DPIs and support tools, Phase II focused on evaluating the benefits of the DPIs and tools through the implementation of a field experiment. The field experiment scenario design represented the deployment of an AEF package for a 30-day mission to Decimomannu Air Base (AB), Italy. The package consisted of 12 F-15Es from Mt Home AFB, 12 F-16C/Ds from Cannon AFB and aircraft support capabilities. The Time-Phased Force Deployment Data (TPFDD) was supplied (simulated) by Headquarters United States Air Forces, Europe (HQ USAFE) at Ramstein AB. With Mt Home as the lead unit and Cannon as the support unit, a joint

tailoring effort was performed defining the final set of resources needed to support the designated aircraft. Within this scenario, the activities specified for HQ USAFE and Decimomannu were simulated prior to experiment execution, with Mt Home and Cannon actively participating. Figure 5 presents an overview for the scenario concept.

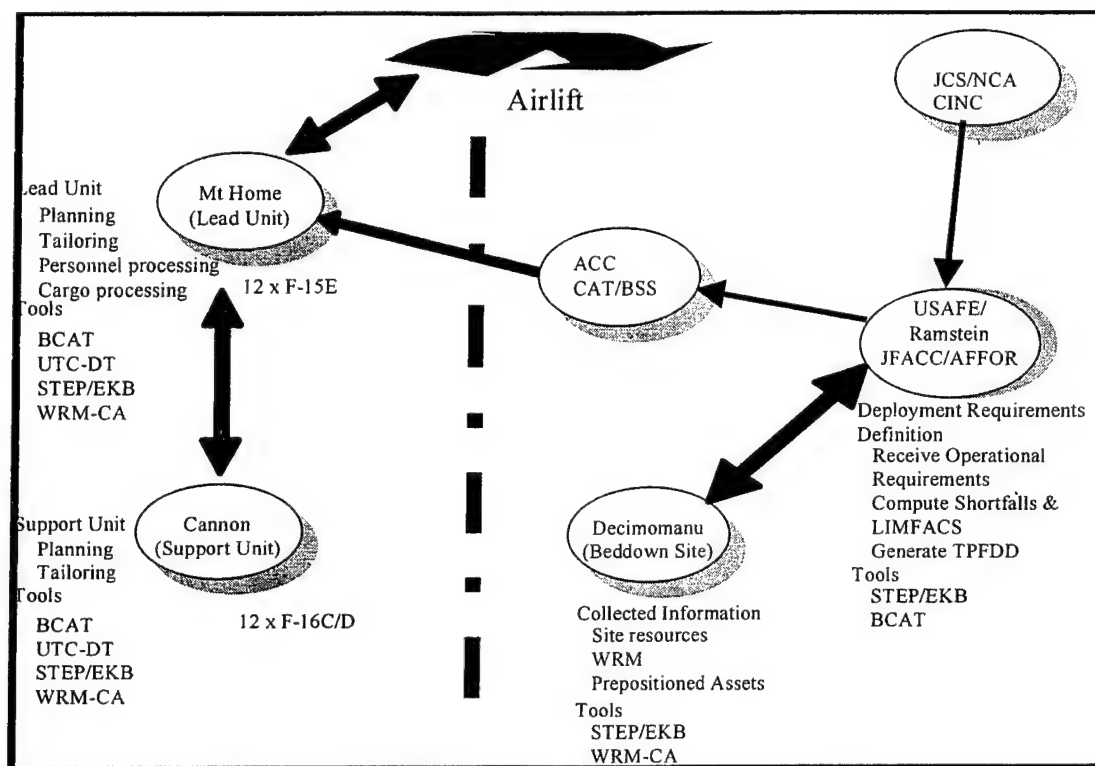


Figure 5. LOG-AID Field Experiment Scenario Overview

As the experiment was being set up, the Kosovo conflict occurred, eliminating the participation of USAFE/Ramstein AB and Decimomannu in the experiment. Adjustments were made to the experiment implementation concept by simulating the USAFE and Decimomannu responsibilities while retaining the planning and deployment preparation performed jointly between Mt Home and Cannon AFBs.

Table 3 provides an overview of the processes and sub-processes involved in wing-level deployment planning and execution, and a framework from which the team addressed deployment activities.

Table 3. Overview of Deployment Activities

| DEPLOYMENT ACTIVITIES | | |
|--|---|--|
| Planning Phase | | |
| Analysis | Tailoring | Load Planning |
| Receipt of warning order | Tailoring within Mt Home using UTC-DT | Prioritization of resources |
| Receipt of deployment order | Coordinated tailoring between Mt Home and Cannon using UTC-DT | Receipt of Airflow |
| Receipt of TPFDD | | Chalk assignment |
| TPFDD Validation | | Validation of Airflow |
| Access of Site survey information (EKB on WPAFB server using BCAT) | | Identification of personnel for deployment |
| Review of the LIMFACS and Shortfalls using BCAT | | Identification of equipment for deployment |
| | | Pre-load plan created using CALM |
| | | Development of the initial DSOE |
| Execution Phase | | |
| Increment Processing | Personnel Processing | |
| Preparation of increments, both rolling stock (powered and non-powered) pallets and bins | Preparation of personnel within the unit using the personnel identification card | |
| Movement of increments to the marshalling Yard | Preparation of personnel within the unit <u>Not</u> using the personnel identification card | |
| Waiting time for increments in the marshalling yard | Mobility Bag Prep at supply | |
| | Waiting time for personnel in holding area | |
| Loading Phase | | |
| Increments | Personnel | |
| Transport of increments from the marshalling yard to aircraft | Transport of personnel to aircraft | |
| Loading of increments into aircraft | Loading of personnel on aircraft | |

1.2.1 Success Criteria

The LOG-AID field experiment was to assess the effectiveness and value of the DPIs and support tools developed through the LOG-AID program. The primary goals of the LOG-AID program were to improve wing-level logistics deployment and planning, reduce deployment footprint, use deployment resources more effectively and efficiently, and reduce deployment response time. These goals are listed in Table 4 along with the metrics to measure the goals. The table also relates the DPIs and tools addressing the goals and impacting the metrics.

Table 4. LOG-AID Field Experiment Criteria

| LOG-AID Program Goals | Success Criteria (Metrics) | Applicable DPIs | Proposed Tool Application |
|--|--|---|--|
| Improve wing-level logistics deployment planning and execution | Reduced resources required. Reduced total time from notification to ready. | <ul style="list-style-type: none"> Implement highly integrated information systems Maximize production and minimize inspection activities Collect deployment process status and effectiveness information using passive methods Provide the UDM capability to produce more deployment-ready personnel and cargo | UTC-DT STEP BCAT |
| Reduce Deployment Footprint | Reduced Pax Deployed Reduced S/Tons of Cargo deployed Reduced Airlift | <ul style="list-style-type: none"> Improve in-transit visibility Implement highly integrated information systems Reduce the number of coverage days included for initial deployments Better define the objective and criteria for UTC tailoring | UTC-DT BCAT STEP |
| Use deployment resources more effectively and efficiently. | Reduction in deployment preparation vehicles used Reduction in Support/augmentees required Reduced idle time of resources Reduced scrap & rework time | <ul style="list-style-type: none"> Implement highly integrated information systems Optimize production and minimize inspection activities Adjust responsibilities and improve integration of M&P Capitalize on cargo and personnel processing similarities Improve in-transit visibility | UTC-DT BCAT STEP IDS Automatic Identification Technology (AIT) |
| Reduce deployment response time | Time between receipt of tasking and departure % Departure times met or improved | <ul style="list-style-type: none"> Implement highly integrated information systems Capitalize on cargo and personnel processing similarities Control tasking receipts into the base Reduce the number of coverage days included for initial deployments | |

1.2.2 Implementation of Deployment Process Improvements

Table 5 correlates the DPIs selected for experiment implementation to deployment steps. Wing-level deployment personnel accomplished the ranking of the DPIs approximately two years ago based on criteria provided and weighted. Additional implementation details are provided in the following paragraphs and a complete list and DPI descriptions are contained in Appendix B.

Table 5. DPIs Selected for Field Experiment Implementation

| | CATEGORIES | RANK 1=high priority | Improved Process Implementation | | | | | | | Generation Of Load Manifest |
|----|--|-------------------------|---------------------------------|----------------------------------|---------------|-----------------|------------------------------------|--------------------------------|-----------------------------------|--------------------------------|
| | | | Site Survey Generation | Correlate Site Resources With | UTC Tailoring | Increment Build | Streamline Personnel Processing | Streamline Cargo Processing | Cargo Movement To The Aircraft | |
| | Deployment Process Improvements | | | | | | | | | |
| | Information System | | | | | | | | | |
| 1 | Implement highly integrated information system across levels of command, across and within deployment and reception sites to include a task receipt-to airlift-manifest information system | 1 | X | X | X | X | X | X | X | X |
| | Process | | | | | | | | | |
| 2 | Maximize production and minimize inspection activities | 2 | | | | X | X | X | X | X |
| 3 | Adjust responsibilities and improve integration of units, manpower and personnel | 3 | | X | X | | X | X | X | X |
| 4 | Capitalize on cargo and personnel processing similarities | 11 | | | | X | X | X | X | X |
| 8 | Reduce the number of coverage days included for initial deployment | 17 | X | X | X | X | X | X | X | X |
| 9 | Better define the objective and criteria for UTC tailoring | 18 | X | X | X | X | X | X | X | X |
| | Training | | | | | | | | | |
| 10 | Apply real-world training characteristics to exercise | 8 | X | X | X | X | X | X | X | X |
| 11 | Maximize training benefits | 4 | X | X | X | X | X | X | X | X |
| 13 | Incorporate training and efficiency evaluation capabilities into LOG-AID systems | 5 | X | X | X | X | X | X | X | X |
| | Policy | | | | | | | | | |
| 14 | Provide the UDM capability to produce more deployment-ready personnel cargo | 10 | X | X | X | X | X | X | X | X |

1.2.2.1 Site Survey Generation

The site survey generation provides an automated capability that reduces the need to send a survey team to the designated site. It allows one or more individuals at a designated site to collect resources and capability information that gets stored in a centralized database for access by units over military communication networks. Collection of the site survey generation is through the STEP tool with the collected data stored in the EKB.

| Site Survey Generation | |
|---|--|
| Objective | Metric |
| Reduce the number of people, and skill level required to perform the survey | <ul style="list-style-type: none"> • Number of people performing site survey • Skill level of personnel performing site survey |
| Increase confidence factor of site survey information | <ul style="list-style-type: none"> • Reliability of the information collected • Time in which survey can be performed |
| Automatically update site survey information and provide in a matter of hours | <ul style="list-style-type: none"> • Time in which survey can be performed • Time from site survey generation request until availability on the EKB database |

1.2.2.2 Correlate Deployment Site Resources with Mission Requirements

Correlating deployment site resources with mission requirements identifies operational shortfalls due to resource depletion and the timeline for deploying in those resources to minimize impacts on operations capabilities. If the resources necessary for the operational scenario cannot be made available, BCAT also provides the capability to perform what-if analyses to determine what mission could possibly be performed with the resources available.

| Correlate Deployment Site Resources with Mission Requirements | |
|---|---|
| Objective | Metric |
| Develop a profile of resources required to support operations tempo using BCAT | <ul style="list-style-type: none"> • Time required to perform the analysis • Personnel required to perform the analysis |
| Provide a capability to identify changes in sortie definitions that effectively use available resources | <ul style="list-style-type: none"> • Impact the analysis will have on the supply pipeline scheduling |

1.2.2.3 Tailor UTC using Decision Support Tools

This sub-process adjusts the contents of a deploying UTC to include only those items necessary to perform the mission. This includes tailoring within a unit based on their past experience, tailoring based on knowledge of items available at the operational site, and tailoring based on the sharing of items among deploying units. Supported by the UTC-DT decision support tool, the basis for the tailoring support lies in the rules within the UTC-DT that specifies the interrelationships among the items within an UTC. If one item is identified for tailoring from the UTC, the rules identify the other items having a dependent relationship, therefore, making them likely candidates for tailoring as well.

| UTC Tailoring | |
|---|--|
| Objective | Metric |
| Reduce the time required to tailor UTCs | <ul style="list-style-type: none"> • Time required to perform the tailoring • Number of personnel record discrepancies |
| Simplify the tailoring process | <ul style="list-style-type: none"> • Number of persons required to perform the tailoring • Skill level of personnel performing the tailoring |
| Standardize the tailoring process across the Major Commands (MAJCOMs) | <ul style="list-style-type: none"> • Level of tailoring coordination within as well as across units and bases |
| Reduce total increments required for deployment | <ul style="list-style-type: none"> • Number of pallets |

| UTC Tailoring | |
|---|--|
| Objective | Metric |
| through inter-unit and beddown site collaboration | <ul style="list-style-type: none"> • Number of rolling stock increments • Weight of increments • Measurement of increments (Separated by powered non-power rolling stock, bins and pallets) |

1.2.2.4 Enhanced Increment Build

The tailoring of a standard UTC discussed above identifies only those items needed to effectively meet deployment mission objectives for a specific tasking. Reducing the items designated for deployment provides the opportunity to integrate and consolidate items from the standard increments, and reduce the number of increments required for deployment. This sub-process improvement takes advantage of the opportunity to reduce the deployment package by facilitating the packaging of optimized increments while keeping accurate records for manifesting and tracking resources.

Several methods, capabilities, and processes can be used to enhance increment building. Many of the capabilities exist today and incorporation into the military environment would involve minimal difficulty. Methods include pre-formed palletized bins, AITs such as bar-coding and bar-code reading devices to inventory bins, Radio Frequency (RF) tags to identify and track increments, and optical memory cards to record increment builds. All methods can be fed into an information system to automatically generate the load manifest.

| Increment Build | |
|--|---|
| Objective | Metric |
| Simplify pallet/increment buildup | <ul style="list-style-type: none"> • Time required designing and completing the increment build. • Skill level of the increment builder |
| Record items and increments to develop load manifests and track assets | <ul style="list-style-type: none"> • Asset visibility throughout the deployment process |

1.2.2.5 Streamline Personnel Processing

Streamlining personnel processing relies in part on personnel records accurately reflecting the status of each individual. The receipt of a tasking order, therefore, should not initiate an effort to review and update those records. Rather, the use of "Smart Cards" and similar technologies provides capabilities to maintain accurate, up-to-date personnel records in the central personnel system. Upon arrival at the unit, an electronic reading of the "Smart Cards" allows for a quick

check-in and record validation, after which the individual proceeds to the holding area and the list of deploying personnel provided as a part of manifest. If rejected, the information system would be able to direct the specific actions necessary to get individuals deployment ready.

Sending the deploying personnel list to supply initiates the mobility bag preparation based on the individuals specifications listed in the personnel database, thus eliminating the need for deploying personnel interaction with supply. As the personnel load into the aircraft, the scanning of the identification cards verifies the loading of a chalk and the manifest generation.

| Streamline Personnel Processing | |
|--|--|
| Objective | Metric |
| Accurate and timely maintenance of personnel records | <ul style="list-style-type: none"> • Time to process through unit • Number of personnel record discrepancies noted |
| Reduce personnel processing cycle time | <ul style="list-style-type: none"> • Time required from notification to reporting to the holding area • Number of people notified • Number of personnel changes |
| Simplify the personnel processing function by eliminating unnecessary steps. | <ul style="list-style-type: none"> • Time required to process personnel through the holding area • Number or percentage of personnel processed through the holding area. |

1.2.2.6 Streamline Cargo Processing

The same rationale and methodology used to streamline personnel processing applies to cargo. Requiring units to be responsible for UTC increment builds, and providing them the tools to accomplish this, are the pre-requisites to implementing this enhancement. Using bar-coding type technologies and a reading device, each item is recorded as it is placed in the increment, resulting in completed increment manifest. Interactions with the items database will identify hazardous materials and the necessary documentation generated along with a list of those authorized to sign the documentation.

As a future capability, the items designated for an increment would be recorded before the increment build begins. This approach provides the opportunity for an increment design tool to specify the packing layout, with special emphasis on the placement of hazardous materials included in the increment. The completed increment would then be ready for movement to a weighing area and then the marshalling area, with possible spot checks to enforce safety.

| Streamline Cargo Processing | |
|--|--|
| Objective | Metric |
| Eliminate the need for the existing CDF | <ul style="list-style-type: none"> • Time required to process increments through the marshalling yard • Number or percentage of increments processed through the marshalling yard • Number of discrepancies noted by marshalling yard |
| Reduce processing time for increments to be moved from unit to marshalling yard. | <ul style="list-style-type: none"> • Time of increment movement from unit to the marshalling yard |

1.2.2.7 Optimize Cargo Movement to the Aircraft

Loading cargo into the transport aircraft generally occurs in two ways. Rolling stock (powered and non-powered) is moved directly to the aircraft and driven or pulled into the aircraft. Pallets and containers are placed on a k-loader using a forklift and then transported to the aircraft. The k-loader then is positioned properly at the aircraft and pallets moved into the aircraft. There may be two or three k-loaders cycling between the marshalling yard and the aircraft. Positioning each k-loader at the aircraft takes considerable time and often ground personnel to act as spotters for safe clearance.

The usage of MHE increases if k-loaders remain positioned at the aircraft, with pallets and containers brought to the k-loader using forklifts or pallet trains. This approach minimizes the use of k-loaders for transport, optimizes their use for loading and unloading, and reduces the time involved in safe positioning.

| Cargo Movement to the Aircraft | |
|---|--|
| Objective | Metric |
| Increase the overall efficiency of the loading process | <ul style="list-style-type: none"> • Percent busy of the load team within the aircraft • Speed of the aircraft loading |
| Decrease the need for MHE, especially the requirement for k-loaders | <ul style="list-style-type: none"> • Number of k-loaders used • Number of forklifts used • Number of tow vehicles |

1.2.2.8 Automatic Generation of the Load Manifest

The load manifest is the control document identifying all the cargo and personnel loaded on an aircraft. Load planners, personnel specialists, and the load master spend considerable time and effort insuring the manifest accurately reflects each person and piece of equipment loaded on an aircraft.

Automatic generation of the Manifest can be accomplished in several ways. Three important elements are necessary:

1. AIT in the form of “Smart Cards” or other passive type information containers that record pertinent personnel information, then are scanned using Palm Pilots or other means.
2. RF tags, optical memory cards, and/or bar codes that contain information about increments, rolling stock and other equipment, and,
3. A connecting information system such as the Integrated Deployment System (IDS) provides the means of linking and integrating the various inputs into the Logistics Module (LOGMOD). The information is then pushed to Cargo Movement Operations System (CMOS) for the generation of the load manifest, which is in-turn pushed to Global Transportation Network (GTN) to support resource tracking to the reception site.

| Generation of the Load Manifest | |
|---|---|
| Objective | Metric |
| Minimize the effort and resources required to generate the load manifest | • Time to generate the load manifest |
| Reduce the errors and changes in the manifest throughout the processing efforts | • Level of effort required to generate the manifest |

1.2.3 Information Technology Solutions

Information tools developed to address these deployment process improvement opportunities are STEP, EKB, BCAT, UTC-DT, and AITs, with the concept for War Reserve Materiel-Capability Analysis (WRM-CA) initiated. Table 6 provides a correlation between the tools and the deployment activities they support.

Table 6. Correlating Processing Activities with Software Tools

| Deployment Preparation Activities | DPI TOOLS | | | |
|---|-----------|------|--------|-----|
| | STEP/EKB | BCAT | UTC-DT | AIT |
| • SITE SURVEY GENERATION | X | | | |
| • CORRELATE DEPLOYMENT SITE RESOURCES WITH MISSION REQUIREMENTS | | X | | |
| • UTC TAILORING | | | X | |
| • INCREMENT BUILD | | | X | X |
| • STREAMLINE PERSONNEL PROCESSING | | | | X |
| • STREAMLINE CARGO PROCESSING | | | | X |
| • CARGO MOVEMENT TO THE AIRCRAFT | | | | X |
| • GENERATION OF LOAD MANIFEST | | | | X |

1.3 Experiment/Demonstration Design

While the field experiment could not occur as planned, efforts were made to collect DPI and the tool benefit information from other sources available during the week designated at Mt Home AFB and Cannon AFB. The following list summarizes the data collection sources, with the remainder of this section summarizing the results. Section 2 provides more detailed information.

- Observation of the Mt Home AFB walk-the-chalk, which incorporated many of the DPI concepts.
- Implementation of UTC-DT at both Cannon and Mt Home AFBs to demonstrate the tailoring of UTCs within a unit and the collaborative tailoring among units at two bases.
- Implementation of BCAT at Mt Home to demonstrate beddown site assessments capabilities.
- Use of scanning technologies to demonstrate the in-checking deploying individuals into the unit and the building the increment manifests.
- Use of satellite technologies for transmitting information, include site survey information and tasking information, between theater locations and the deploying sites.

1.3.1 Highlights From Base-Level Walk-The-Chalk Exercise

Significant effort was directed toward implementing integrated information systems such as LOGMOD and IDS. While not yet fully implemented and operational, these capabilities allow single information entry and information access throughout the process. Modules of LOGMOD were used but not in an integrated mode.

Full responsibility for increment documentation was assigned to the units, with no review performed CDF processing.

Cargo movement accomplished using mostly bins and very few pallets.

The cargo required for a 7-day deployment was demonstrated as being much less than for a 30-day deployment. While a 30-day deployment was planned, some units understood the walk-the-chalk exercise to represent a 7-day deployment, and therefore significantly tailored their UTC to meet the 7-day requirements. While confusion existed, the important point was that the quantity of resources deployed varied according to the deployment duration, thus the shorter the time the smaller the deployment footprint. Another perspective on this situation is that if sustainment can start in less than 30 days, the deployment footprint can also be reduced.

Results of an 8-month effort by Mt Home AFB to redefine their UTCs in preparation for the walk-the-chalk dramatically demonstrated the need to restructure UTCs based on today's operational requirements. The restructuring not only redefines individual UTCs but also redefines and minimizes the number of UTCs maintained at a base.

Explanations to all players about what was going to happen, what part everyone was going to play, and the responsibilities assigned during the walk-the-chalk exercise resulted in more of a team effort with less concerns voiced about wasted time by the augmentees.

Due to the significant tailoring required to meet the walk-the-chalk exercise requirements, most pallets were new builds and not based on a predefined, standard build, therefore requiring skill personnel. Because those skills are limited, the potential need for a pallet build-up tool was demonstrated.

Preparation of complete and accurate increment documentation required more unit time, but decreased the CDF processing time. The situation indicated that the use of computerized tools to support the documentation preparation at the unit would reduce unit preparation time and therefore overall increment processing time.

Pictures taken of each completed increment provide guidance for future similar deployment preparation efforts, thus minimizing the learning curve for each deployment. These pictures provide a starting point towards the development of full deployment guides that can effectively support the hand over of responsibility as new people take responsibility.

1.3.2 Simulation Analysis Summary

Without the planned field experiment to evaluate and demonstrate the DPIs and tools developed as part of the LOG-AID program, simulation models were developed during the course of the program provided an alternative analysis capability. Originally intended to identify critical portions of the deployment process using sensitivity analysis approaches, the simulation models were extended to represent the As-Is and To-Be deployment processing with the incorporation of the DPIs and their estimated performance characteristics.

The simulations models identified the critical wing-level deployment path as being the cargo preparation and processing path, assuming the deploying resources include a significant number of increments and personnel, which is usually the case. For deployments involving mostly personnel with only a couple of increments, the critical path will vary between personnel and increment processing at various stages during the process.

The identification of cargo processing down to the increment level as the critical path, the simulation analysis identified significant value improvement of the following areas:

- Tailoring UTCs for deployment reduces the number of increments deployed, with each increment eliminated resulting in a reduction in the deployment timeline. Improving the tailoring process addresses the level of tailoring performed and the effectiveness of the tailoring process. The level of tailoring addresses the design efficiency of the standard UTC. Better up-front definition of UTC contents results in less tailoring required in preparing the UTC for deployment. The efficiency of the UTC-DT tool in the tailoring

process addresses the speed at which the tailoring can be accomplished. With its rule base, the UTC-DT tool helps generate a quick first cut at the UTC tailoring and providing the tailoring experts with a better starting point and to coordinate tailing among units without face-to-face meetings.

- Improving the deployment schedule development ensures the deployment processing occurs in the most efficient manner possible. During a deployment, conditions change on a regular basis. Having the ability to quickly evaluate the impact of those changes on the schedule and to adjust the schedule as necessary helps focus the processing towards the critical path.
- Improving increment preparation reduces the need for highly skill personnel and transforms the increment buildup process from one requiring significant design time to one focused almost entirely on the increment building.
- Reducing the need for the CDF processing results in a reduction in total processing time because of it being on the critical path. The CDF includes a combination of quality assurance checks and increment weighing. Assuming the continued use of scales for weighing, a centralized weighing station will likely remain such as currently exists at the CDF. Current CDF processing takes approximately 10 minutes, with approximately 7 of those 10 minutes used for weighing. The remaining 3 minutes is primarily needed to complete and correct increment documentation. Therefore, having units correctly generate the increment documentation reduces deployment processing time by approximately 3 minutes per increment. Since increments are normally processed sequentially through the CDF, the timesaving per chalk would be 3 minutes times the number of increments in the chalk.

While not normally on the critical path, personnel processing results in incremental savings for the deploying personnel and for the augments supporting the personnel processing.

- Having an integrated information system to record personnel status as it occurs reduces the time and effort required selecting individuals for deployment. Through the integrated information system, the unit selects the appropriate person without

interactions with the manpower and personnel organizations. This change result is a timesaving ranging from potentially hours down to minutes.

- Using smart card type technology, personnel selected for deployment arrive at their unit and scan their card for deployment verification, placing their name on the load manifest, and pushing their information to supply for mobility bag generation. The timesaving for the checking of personnel records drops from 20 minutes to seconds and the generation of the load manifest drops from approximately 5 minutes per person throughout the deployment process to approximately 1 minute. With the personnel information pushed to supply, the deploying personnel are not required to move to supply, verify their mobility bags, and place the bags on the pallet. This process change saves approximately 30 minutes for each personnel group.
- Having up-to-date personnel records provided through an integrated information system and associated technologies, personnel processing through the PDF could be greatly reduced if not eliminated. The PDF would become primarily a holding and briefing area.

1.4 Conclusions/Recommendations

When considering a wing-level deployment that starts with the receipt of the execution order and ends with the loading of the deploying resources on the transporting aircraft, the deployment process comprises a set of individual, yet connected activities. Some of these activities process in a serial manner while other operate in a simultaneous or parallel manner. The deployment processing begins with serial processing to include the planning and scheduling for the deployment. Planning involves identifying the type and number of resources required to satisfy the deployment and mission requirements and the assignment of specific resources to fill those requirements. The scheduling represents the development of a plan to accomplish the deployment of those deploying resources.

The parallel processing in the middle of the deployment process includes the selection and preparation of cargo and personnel resources for deployment and their processing through to the point of their loading into the transport aircraft. The deployment process returns to serial

processing during the loading of resources into the transport aircraft. In general, one chalk is loaded at a time with the increments first and then followed by the personnel. If sufficient support MHE is available, multiple chalks can be loaded in parallel, but due to MHE limitations, loading two aircraft may diminish the efficiency of any one aircraft loading process.

The final process observation relates to the critical path that transverses through the serial and parallel processing. The critical path starts with the serial processing at the front end of the process and in general goes through the cargo processing function of parallel processing, ending with the serial processing involved with loading the aircraft. Looking at the process in this manner, improvements addressing the serial processing activities provide a nearly direct impact on the total processing time as well does the improvements on the critical path activities within the parallel processing. Therefore, the improvements providing the most impact are the following:

- Integrated information system
- Tailoring
- Scheduling
- Preparation of increments
- Minimized processing of increments through the CDF
- Efficient use of MHE to move the increments from the holding area and loading them into the transport

For the non-critical path, the primary areas benefiting from improvement are the preparation of personnel at the units and the reduced need for CDF processing. While improved personnel processing do not significantly impact the final deployment timeline, impacts do address the non-productive processing time used by the deploying personnel. Specifically, the use of smart card type technology to check deploying personnel reduces the unit processing significantly. Also impacting personnel processing is the checking of mobility bags by deploying personnel, especially when the checking requires travel to a location away from the CDF location. Finally,

the processing of personnel through the CDF should be reduced or eliminated except for briefings and short-term holding area prior to loading into the aircraft.

Since the start of the LOG-AID program, changes have occurred within the Air Force and the global environment. In response to these changes, the Air Force has initiated some changes to the wing-level deployment process that are in line with the improvement concepts of the LOG-AID program. Of specific importance has been the increased focus on implementing an integrated information system to support the process. Accomplishing this provides the most benefit by far.

Additional recommended steps for implementing an improved wing-level deployment process follow in the recommended order of implementation:

- Evaluate the effectiveness of current UTC definitions with a goal of better supporting the operational concept for Expeditionary Aerospace Forces (EAF). When doing this, capture the rule base behind the design and incorporate it into UTC-DT for future tailoring support.
- Implement UTC-DT to streamline the tailoring process, including the use of site survey information accessed from the EKB, operational information from BCAT, and coordinated tailoring among units deploying to the same location.
- Evaluate and redesign the increment buildup for the new UTC definitions to optimize space and to document the design for future use.
- Implement AIT to facilitate resource status recording that will be followed by the reduced need for CDF and PDF processing.
- Draft new AFIs that better meet the needs for guiding the deployment process.

1.5 Applicable Documents

Interim Technical Report for Logistics Analysis to Improve Deployability (LOG-AID), 1 June 1998.

Field Experiment Plan for Logistics Analysis to Improve Deployability (LOG-AID), 12 July 1999 (Appendix C).

2 DETAILED ANALYTIC PREDICTIONS/RESULTS

Because the LOG-AID Field Experiment did not occur as planned, an alternate, two-method approach was devised as a basis for evaluating the improvement concepts. Method one translated information and observations from the walk-the-chalk into an analysis of what DPIs were incorporated into the walk-the-chalk and an estimate for the benefits received. Method 2 used simulation models developed during the course of the LOG-AID program to represent the As-Is and To-Be deployment processes, thus provided a capability to discuss the performance differences between them. Specifically, using the simulations, a comparison between the As-Is and To-Be process at Mt Home AFB will be made followed by a comparison between the As-Is and To-Be generic processes will be made.

2.1 Walk-the-Chalk

The walk-the-chalk performed at Mt Home AFB established a baseline for their support of the AEF deployment requirements, involving a 30-day deployment effort. The walk-the-chalk preparations involved an approximate 8-month effort directed at establishing their cargo and rolling stock capabilities to satisfy the deployment requirements. Log planners reviewed their pilot UTCs and, based on an analysis of UTC equipment and overlapping requirements, tailored and redefined those UTCs. The tailoring focused on those items needed to support the specified mission. The redefinition focused on arranging the selected items into well-defined UTCs and the prioritization for deployment of those UTCs. The non-rolling stock items were packed into increments/pallets. With a goal of maximizing space and minimizing the number of increments, bins were used primarily along with only a few pallets. Along with the packing, the units were instructed on how to correctly prepare the necessary increment documentation because the CDF processing would only include weighing and measuring, not documentation verification.

Some repacking among increments further minimized the number of increments needed to transport the UTCs. This repacking included combining items from more than one UTC if increment space allowed. Once packed into their final configuration, an inventory and pictures were taken as a reference for future deployment preparations.

An analysis of the walk-the-chalk process identified that many of the LOG-AID DPIs were incorporated. Table 7 highlights the DPIs incorporated into the walk-the-chalk actions, and when possible, identifies the improvement potentials.

Table 7. Incorporation of DPIs into the Walk-the-Chalk

| Related Deployment Process Improvement | Walk-the-Chalk Exercise | Benefits Observed/Predicted |
|---|--|--|
| Information Systems | Information Systems | Information Systems |
| <p>DPI # 1 Implement highly-integrated information system across levels of command, across and within deployment and reception sites to include a task receipt-to airlift-manifest information system</p> <p>Sub-sets of this DPI include a variety of features to automate tasks within the deployment process, such as:</p> <p>Scheduling Module within LOGMOD and used.</p> <p>Unit schedule overlap id Not used during the walk-the-chalk</p> <p>Tailoring (UTC-DT) Tailoring and redefinition of their standard UTC resulted in new UTCs</p> <p>Troop commander selection Not implemented during the walk-the-chalk</p> <p>Augmentee selection Not implemented during the walk-the-chalk.</p> <p>Travel orders Not implemented during the walk-the-chalk.</p> <p>Load planning Used module within LOGMOD</p> <p>Load manifesting Not implemented during the walk-the-chalk.</p> <p>Evaluating reception site capabilities (BCAT) Not implemented during the walk-the-chalk</p> | <p>Significant effort was directed toward implementing integrated information systems such as LOGMOD and IDS. While not yet fully implemented and operational, these capabilities allow single information entry and information access throughout the process. Modules of LOGMOD were used but not in an integrated mode.</p> | <p>Because the walk-the-chalk used modules of LOGMOD not the integrated capability, full benefits could not be demonstrated. The anticipated benefits include reductions in processing time, information errors, and augmentees.</p> |
| Process | Process | Process |
| <p>DPI #2 Maximize production and minimize inspection activities</p> | <p>Two primary areas to include inspections and the physical movement of increment to the aircraft.</p> <p>For the walk-the-chalk, units were assigned full responsibility for documentation preparation, with no</p> | <p>Streamlining the process by assigning units the responsibility for developing accurate increment documentation had minimal impact on unit preparation time but significant impacts on the CDF processing. The five major functions of inspection, weighing,</p> |

| Related Deployment Process Improvement | Walk-the-Chalk Exercise | Benefits Observed/Predicted |
|--|---|--|
| | <p>document review and correction occurring during CDF processing.</p> <p>The physical movement of the increments was conducted using mostly bins and very few pallets.</p> <p>The bins were packed within each unit with a goal of maximizing the available space. Once packed by the unit, an inspection increased packing effectiveness by including the combining of items from across UTCs to fill partial increments.</p> | <p>measuring, load planning update, and increment documentation verification occur simultaneously. Of these, documentation verification presents the most problems and often takes longest to complete. With documentation verification removed, CDF processing time was reduced by approximately three minutes per increment, reduced augmentee workload in the CDF, and reduced the number of augmentees required in the CDF by approximately two.</p> <p>Using bins reduced the packing time, reduced the possibility of damage during increment movement, and reduced the time required to process through the CDF. The checking of the bin packing generated new ideas for organizing the cargo based on available space rather than on just the operational relationships among the cargo.</p> <p>The one drawback is the continued need for specialized and limited forklifts and K-Loaders for increment movement.</p> |
| <p>DPI # 8 Reduce the number of coverage days included for initial deployment</p> | <p>The walk-the-chalk exercise was specified as a 30-day deployment. However, some units understood the duration to be 7 days, and tailored out much more than needed. While confusion existed, the important point was that the quantity of resources deployed varied according to the deployment duration, thus the shorter the time the smaller the deployment footprint.</p> | <p>With tailoring rules identified and loaded into UTC-DT, the required tailoring time could be reduced significantly. The benefits for the future would include less skilled personnel being able to exercise the initial tailoring effort using UTC-DT. More skilled personnel would then continue using UTC-DT to fine-tune the tailoring by using previous experience, accessing site survey information, and collaborating with other units deploying to the same location. Tailoring in this manner decreases the tailoring time, reduces the level of effort by the skilled tailoring personnel, and reduces the time required for face-to-face tailoring meetings.</p> |

| Related Deployment Process Improvement | Walk-the-Chalk Exercise | Benefits Observed/Predicted |
|---|--|--|
| DPI # 9 Better define the objective and criteria for UTC tailoring | Pilot UTCs at Mt Home AFB were reviewed and evaluated over an 8-month period to produce the UTC set for the walk-the-chalk. | During the redefinition of the UTCs and the subsequent tailoring of those new UTCs, item relationship rules were identified and applied. Documenting the relationship rules into UTC-DT as part of the UTC redefinition prevents the loss of those rules, thus making them available for future tailoring efforts. Not having to reestablish the rules allows future tailoring efforts to be accomplished more quickly, with more consistency, and with fewer skilled personnel. Based on information received from Mt Home, the UTC review and redefinition significantly reduced the number of pilot UTCs managed at Mt Home by approximately 90%. |
| | | |
| TRAINING | TRAINING | TRAINING |
| DPI # 10 Apply real-world training characteristics to exercise | The walk-the-chalk scenario was based on a real-world situation requiring a fast response to a non-standard situation. The reaction required units to throw away their standard UTCs and start from scratch to satisfy the requirements. While the 8-month preparation effort is far from being the actual time needed for a successful deployment, the walk-the-chalk provided an example for the work required to address AEF scenarios. | |
| DPI # 12 Include total process training | Effort was put forth to explain to all players what was going to happen, what part everyone was going to play, and the responsibilities assigned. For example, the units were notified to prepare transport-ready increments, including the documentation. | Fewer augmentees were trying to figure out what they were to do, but rather understood their responsibilities and actively tried to interact with individuals performing other portions of the deployment process. In comparison with other observed deployments, there was a reduced frustration level and a reduced number of negative comments about the deployment processing. |
| POLICY | POLICY | POLICY |
| DPI # 14 Provide the UDM capability to produce more deployment-ready personnel cargo The capabilities included in this DPI are: 1. Resource tracking 2. Resource Selection 3. Update unit resource availability list 4. Reference to pallet rules | For the walk-the-chalk, units were required to tailor their UTCs for a 30-day deployment, effectively package those resources primarily in bins and a few pallets, and to prepare accurate increment paperwork. These requirements begin to place responsibilities back to the unit and increase the need for tools to support the effort. | Observations from the walk-the-chalk are the following: Pallet buildup (UTC-0) The walk-the-chalk considered two aspects of this DPI. One, with the redefinition of the UTCs, each pallet/bin was built up without previous knowledge or guidelines. Two, following the |

| Related Deployment Process Improvement | Walk-the-Chalk Exercise | Benefits Observed/Predicted |
|---|--|--|
| <p>5. Identification of pallets with HazMat Pallet Buildup</p> <p>6. Increment Documentation</p> | <p>Pallet Buildup (UTC-O)</p> <p>Both aspects were performed manually during the walk-the-chalk; therefore the requirements for this tool exist.</p> <p>Increment documentation</p> <p>Units were instructed to develop the necessary documentation for each increment and ensure its accuracy because it would not be checked during the CDF processing.</p> | <p>initial build; an evaluation of the increment builds caused some repacking, including some transfers among UTCs to help maximize the use of increment space. The question yet to be answered is whether or not the rule base for this tool can be effectively established to support the bin/pallet buildup team.</p> <p>Increment documentation</p> <p>Because of the direction given, each unit spent more time than usual completing the increment documentation. If available, the increment documentation tool would reduce the documentation preparation and processing time.</p> |
| <p>DPI # 15 Develop deployment guides for each deployment position</p> | <p>Pictures were taken of each completed increment to guide future deployment preparations, thus minimizing the learning curve for each deployment. This is a starting point towards the development of full deployment guides that can effectively support the hand over of responsibility as new people take responsibility.</p> | <p>Using the pictures as reference for future deployments reduces the number of individuals required performing the preparation and in some cases reducing the skill-level of those individuals. Specific examples would be the use of a tailoring tool to perform an initial cut at the tailoring, thus reducing the overall tailoring time and bringing in the experts after a couple of cuts have been made.</p> |
| <p>DPI # 16 Refine the AFI's as necessary to best guide the deployment process</p> | <p>The guidance provided to the Air Force personnel was more at the AFI rather than Air Force Regulation (AFR) level, thus allowing individual units to decide their specific approaches.</p> | <p>Results from the walk-the-chalk will be more specific direction ranging from the definition of UTCs to the packing of bins that will eventually become more stringent direction to the units, possibly as AFRs.</p> |
| <p>PERSONNEL ISSUES</p> <p>DPI # 17 Develop benefits for augmentees performing deployment efforts</p> | <p>The improvement efforts implemented during the walk-the-chalk focus on streamlining the deployment process, both as process increments and the total process.</p> | <p>The reduced deployment workload relates directly to a reduced requirement for augmentee support. A reduction in augmentee requirements in turn translates into an increased willingness for personnel to function as augmentees and therefore a reduced effort in supporting the READY program.</p> |

2.2 Simulation Analysis

Using a sensitivity analysis approach, simulation models developed during LOG-AID became tools to predict or estimate the benefits provided by the DPI on the wing-level deployment process. Figure 6 identifies the simulation models and their use within the DPI evaluation. Baseline or As-Is simulation models represent a generic Air Force wing-level deployment process and the Mt Home AFB specific wing-level deployment process. The predicted impacts of the DPIs incorporated into both of the As-Is models to form the corresponding To-Be models. Comparing the As-Is and To-Be generic models, and the As-Is and To-Be Mt Home AFB specific models produced the predicted benefits for Mt Home AFB and Air Force wing-level deployment process.

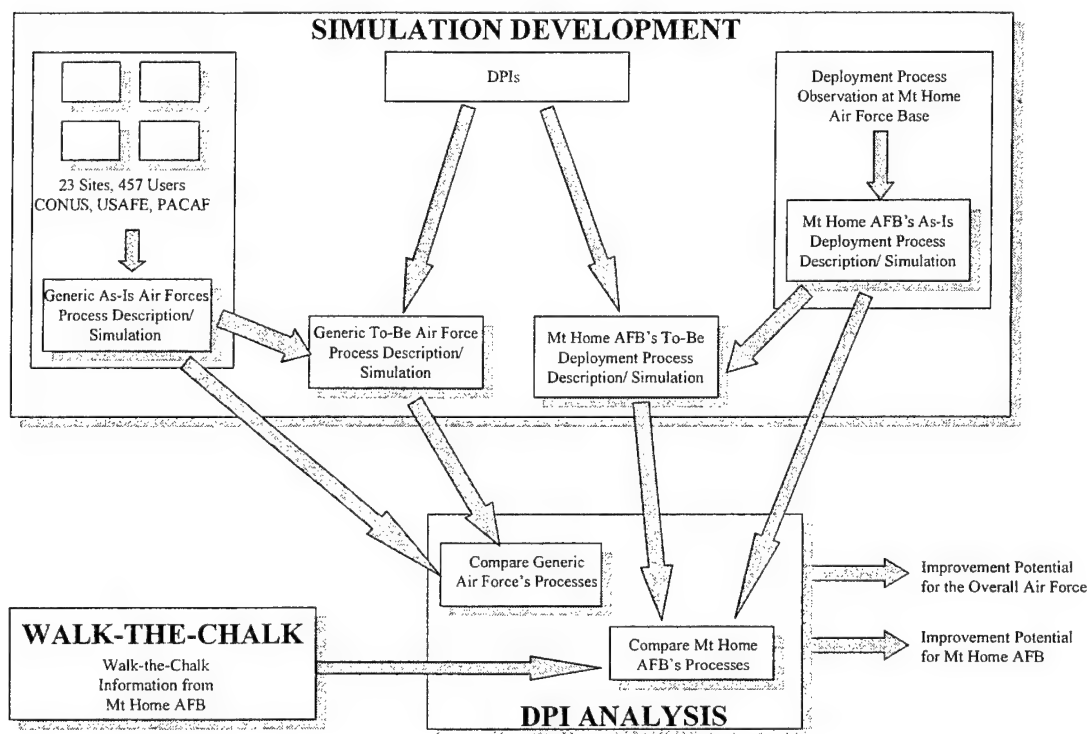


Figure 6. Analysis Steps using the Simulation Models

Information for developing the generic Air Force As-Is wing-level simulation model came from 457 individuals at 23 sites within the CONUS, USAF, and PACAF. Information for the Mt Home AFB specific As-Is simulation came from discussions with deployment personnel at Mt Home AFB, and observing and collecting performance information during Mt Home AFB

deployment operations. While the information for developing the corresponding To-Be models was planned to come from data collection during the field experiment, only limited performance information was obtained from the walk-the-chalk, thus limiting the effectiveness of the analysis.

2.2.1 Simulation Assumptions

As with all simulation models, there are assumptions imbedded into the design that impact the analysis results. For the LOG-AID simulations, the assumptions are the following:

- The simulation analysis assumes no warning orders provided; therefore the execution order receipt is the true deployment starting point. Under current conditions, units often receive unofficial notice of their deployment. Upon receipt of the warning order, units often begin their deployment planning and preparation, including the buildup of some increments. However, current deployment timing begins with the receipt of the execution order, meaning that not all the processing performed gets included in the time definition. For the AEF operational concept, the deployment tasking may arrive with little or no warning, meaning the execution order may arrive with the warning order. Therefore, from an analysis perspective, the deployment processing is measured from the start of the processing.
- All personnel necessary to perform the jobs are available.
- If an increment is rejected in the CDF and sent back to the unit, it is repaired or replaced and does not get frustrated again in the CDF.
- Only one increment of mobility bags exists per chalk.
- In the As-Is simulation, all personnel process through the PDF, and at least stop at the eligibility check, ID/dog tags, and medical workstations. In the To-Be simulation, only those personnel requiring processing through a workstation stop at the PDF.
- A 20-minute delay exists between the time the last passenger is loaded on the aircraft and the aircraft takes off and departs the base.
- Improvements incorporated into the To-Be simulations were the following:

Information Systems

An integrated information processing capability was assumed. This took away considerations for the time needed to physically move data between systems, to reenter data multiple times, and to eliminate any processing errors caused by inaccurate data.

Process

Optimize production and minimize inspection activities

Processing of personnel into the unit is done using smart card type technology. During day-to-day operations, all personnel records were maintained and recorded on the smart card, with duplicate information contained in the personnel database. At tasking receipt, any additional deployment requirements are added to the personnel database. At the time of personnel arrival at the unit, each person's smart card is read, compared against the standard and deployment specific requirements to identify any unsatisfied requirements. Any unsatisfied requirements should be due to unique requirements for the deployment and in general be the responsibility of the unit.

Cargo preparation assuming the use of tools. These tools support the design of the increment buildup, the generation of the increment manifest during increment buildup, and the generation of the increment documentation based on the increment manifest, to include the generation of the hazardous material documentation.

Adjust responsibilities and improve the integration of units, manpower, and personnel

Using smart card type technology, personnel information is up-to-date and accurate, eliminating the communications among the organization to ensure the selected personnel meet the deployment criteria.

Collect process status and effectiveness information using passive means

The status of all processing was accurately known and relayed to the DCC in a timely manner to eliminate any processing delays.

Improve in-transit visibility

In coordination with the passive collection of processing information, the location of all deploying resources is known to support the efficient movement of those resources.

Control tasking receipt into the base

The deployment processing started when the execution order arrived, thus preventing the pre-building of increments in anticipation of a deployment.

Better define the objective and criteria for UTC tailoring

Assume the need for tailoring and use UTC-DT to support the coordinated tailoring process.

Policy

Develop deployment guides for each deployment position

Individuals performing the deployment process were assumed to be well trained or have the information available to effectively and efficiently perform their portion of the deployment process.

2.2.2 Analysis Concept

The simulation analysis focuses around a number of metrics, of which time is of primary importance along with the resources needed to perform the deployment process. The most obvious time measurement refers to the total time to complete a deployment. A reduction in the completion time signifies the base can accomplish their deployment faster, thereby getting closer to satisfying the AEF operational objectives. Key to reducing total processing time is reducing the processing times of those activities lying on the critical path.

Also important is the reduction of processing time and resources for intermediate activities within the deployment process but not on the critical path, therefore possibly not impacting the total processing time. The benefits received from reducing intermediate activity times include, for example, reduced augmentee work time, allowing them to return to their normal work responsibilities or making them available for other augmentee positions during the deployment. Therefore, the simulation analysis addresses both total time and intermediate times.

2.2.3 Simulation Input Conditions

The simulation analysis occurred at two points during the LOG-AID program. The first simulation occurred based on performance information collected during the initial visits and the second focused towards field experiment. The first generic model simulation was based on a combination of increments and personnel quantities characteristic of a fighter squadron UTC providing a representative number of thirteen increments and rolling stock, and personnel making up six chinks. The baseline UTC parameters for the second simulation analysis are shown in Table 8. The Mt Home AFB simulation was based on 3FQKLO UTC

Table 8. Simulation Scenarios

| | INCREMENTS | | PASSENGERS | |
|-----------------------|---|----------------------------|---|----------------------------|
| | Generic Model | Mt Home AFB Specific Model | Generic Model | Mt Home AFB Specific Model |
| UTCs | 3FQK10 6KTAAO QFEBCO HGHQ10 HFDESO FFLGEO 63FQK11 | 3FQKLO | 3FQK10 6KTAAO QFEBCO HGHQ10 HFDESO FFLGEO 63FQK11 | 3FQKLO |
| CHALK 1 | Total = 15 | Total = 18 | Total = 38 | Total = 38 |
| Unit: #1 | 3 | 4 | 3 | 3 |
| Unit: #2 | 10 | 12 | 4 | 4 |
| Unit: #3 | 2 | 2 | 31 | 31 |
| CHALK 2 | Total = 11 | Total = 14 | Total = 51 | Total = 51 |
| Unit: #1 | 4 | 5 | 23 | 23 |
| Unit: #2 | 6 | 8 | 21 | 21 |
| Unit: #3 | 1 | 1 | 7 | 7 |
| CHALK 3 | Total = 18 | Total = 22 | Total = 47 | Total = 47 |
| Unit: #1 | 6 | 7 | 27 | 27 |
| Unit: #2 | 4 | 5 | 2 | 2 |
| Unit: #3 | 8 | 10 | 18 | 18 |
| CHALK 4 | Total = 2 | Total = 7 | Total = 18 | Total = 18 |
| Unit: #1 | 2 | 7 | 18 | 18 |
| CHALK 5 | Total = 7 | Total = 14 | Total = 7 | Total = 7 |
| Unit: #1 | 4 | 8 | 4 | 4 |
| Unit: #2 | 1 | 2 | 1 | 1 |
| Unit: #3 | 2 | 4 | 2 | 2 |
| CHALK 6 | Total = 7 | Total = 21 | Total = 12 | Total = 12 |
| Unit: #1 | 1 | 3 | 11 | 11 |
| Unit: #2 | 6 | 18 | 1 | 1 |
| TOTAL QUANTITY | 60 | 96 | 173 | 173 |

2.2.3.1 Process Increment Analysis

As a first step in the simulation analysis, two simulation models were developed to represent the generic Air Force deployment process. The As-Is simulation used information collected from the visited sites and aggregated into a single process definition. The accuracy of the first generic As-Is simulation was verified with users during the information collection visits. Incorporating performance improvement estimates into the As-Is produced the first generic To-Be simulation model. Exercising the model by using the generic scenario stated earlier produced the results presented Table 9 and representing the preparation of the first chalk.

Table 9. Initial Generic Processing Comparison

| Processing Action | As-Is Time (Min) | To-Be Time (Min) | Improvement Percent |
|-------------------------------|-----------------------------|-----------------------------|--------------------------------|
| Coordinate Force Requirements | 120 | 50 | 58 |
| Generate DSOE | 120 | 60 | 50 |
| Cargo Prep | 320 | 190 | 41 |
| Personnel Prep | 77 | 15 | 80 |
| CDF Processing | 170 | 13 | 92 |
| PDF Processing | 13 | 3 | 77 |
| Total Deployment | 16 hrs | 9 hrs | 44 |

As refinement of the collected information occurred over the course of the program, adjustments made to the simulations resulted in the results summarized in Table 10. The cargo preparation times are specifically different between the first performance estimates and the refined estimates. Also listed within the table is the type of benefits received from the improvements.

Table 10. Improvement Impacts on Sub-Processes

| Deployment Processing Action | Generic As-Is Time (Min) | Generic To-Be Time | Percent Improvement | Estimated Augmentee Reduction per Shift | Mt Home AFB As-Is Time | Mt Home AFB To-Be Time | Percent Improvement | Benefits |
|-------------------------------|--------------------------|--------------------|---------------------|---|------------------------|------------------------|---------------------|--|
| Coordinate Force Requirements | 120 | 80 | 33 | 33 – 50% | 120 | 80 | 33 | <p>The tailoring process is supported by UTC-DT with information received from STEP, EKB, and BCAT. The benefits received include the following:</p> <ul style="list-style-type: none"> • Quick development of the initial tailoring using UTC-DT with its rule base. In addition to being generated quickly. • Consistent tailoring results from one time to the next by reducing personal preferences through the use of rules. • Reduced skill required to perform the initial tailoring • Reduce workload on skill personnel because a quality starting point is provided. • Reduce time and travel to perform collaborative tailoring without needing face-to-face meetings. |
| Generate DSOE | 120 | 60 | 50 | 60% | 120 | 60 | 50 | <p>Scheduling is maintained distributed efficiently using the integrated information system as both the data source and the distribution media.</p> |

| Deployment Processing Action | Generic As-Is Time (Min) | Generic To-Be Time | Percent Improvement | Estimated Augmentee Reduction per Shift | Mt Home AFB As-Is Time | Mt Home AFB To-Be Time | Percent Improvement | Benefits |
|------------------------------|--------------------------|--------------------|---------------------|---|------------------------|------------------------|---------------------|---|
| Cargo Preparation | 780 | 585 | 25 | 33 – 50% | 1560 | 1388 | 11 | <ul style="list-style-type: none"> • Reduced need for highly skilled personnel to build increment due to the availability of increment build up information. • Reduced effort required to build the increment manifest that is developed automatically as an integral part of the build. • Real-time support of the load planning since increment information is fed to the load planning through the integrated information system. |
| Personnel Preparation | 49 | 5 | 90 | 33 – 50% | 49 | 5 | 90 | <ul style="list-style-type: none"> • Improved selection of personnel for deployment, thus reducing the shifting of personnel to fill a deployment requirement • Reduced time to process the deploying personnel through the unit and on their way to the transport. |

| Deployment Processing Action | Generic As-Is Time (Min) | Generic To-Be Time | Percent Improvement | Estimated Augmentee Reduction per Shift | Mt Home AFB As-Is Time | Mt Home AFB To-Be Time | Percent Improvement | Benefits |
|------------------------------|--------------------------|--------------------|---------------------|---|------------------------|------------------------|---------------------|---|
| CDF Processing | 169 | 18 | 89 | 60% | 169 | 130 | 23 | <ul style="list-style-type: none"> Reduced processing requirements due to the improved and more complete preparation performed by the unit. Primary CDF responsibility will be increment weighing. Fewer augmentees needed to support the CDF process since the majoring of work involves those performing the weighing and updating the load plan. |
| PDF Processing | 80 | 20 | 75 | 40% | 80 | 20 | 75 | <p>The CDF becomes primarily a holding and briefing presenting area. As such the benefits include:</p> <ul style="list-style-type: none"> Few augmentees needed because the reduced need CDF station. |
| Total Deployment | 18:53 hrs | 17:14 hrs | 10% | 43 - 51% | 30:08 | 24:06 | 20% | |

2.2.3.2 Total Process Analysis

As the initial simulations were exercised and evaluated, model adjustments were identified and incorporated. Once updated the As-Is and To-Be simulation models were again exercised by using the simulation scenarios defined in Table 8. The resulting chalk and total processing times from these simulations are presented in Table 11. Before discussing these results, a point of clarification is needed. The simulations assumed the chalk preparation starting order to be that from 1 through 6, but as indicated by the chalk completion times, chalk 4 completed before chalk 3. The reason being that chalk 4 is significantly smaller than chalk 3, which allowed chalk 4 processing to be completed before chalk 3 even though chalk 3 processing started first. To facilitate the discussion of the results, the order of chalks 3 and 4 in Table 11 are reversed to better show the order of completion.

Table 11. Simulated Processing Results

| Simulation | Chalk # | | | | | |
|----------------------------|------------|-------------|-------------|-------------|-------------|-------------|
| | 1 | 2 | 4 | 3 | 5 | 6 |
| Take-Off Time | | | | | | |
| Generic As-Is | 18:53 | 21:32 | 24:05 | 25:38 | 27:49 | 29:51 |
| Generic To-Be | 17:14 | 18:20 | 20:16 | 22:34 | 24:53 | 26:31 |
| Percent Change | 8.7 | 14.9 | 15.8 | 12.0 | 10.5 | 11.2 |
| Mt Home AFB As-Is | 30:08 | 32:38 | 36:41 | 38:43 | 42:11 | 65:49 |
| Mt Home AFB To-Be | 24:06 | 26:42 | 30:30 | 32:21 | 35:51 | 52:43 |
| Percent Change | 20 | 18 | 17 | 16 | 16 | 20 |
| Time Between Chalks | | | | | | |
| Generic As-Is | 18:53 | 2:39 | 2:33 | 1:33 | 2:11 | 2:02 |
| Generic To-Be | 17:14 | 1:06 | 1:56 | 2:28 | 2:19 | 1:38 |
| | | | | | | |
| Mt Home AFB As-Is | 30:08 | 2:30 | 4:03 | 2:02 | 3:28 | 23:38 |
| Mt Home AFB To-Be | 24:06 | 2:36 | 3:48 | 1:50 | 3:31 | 16:52 |

Looking first at the total processing times for the six chalks as indicated by the completion time of chalk 6, the generic Air Force deployment processing, the time went from the As-Is time of 29:51 to the To-Be time of 26:31, for a reduction of 11 percent. In comparison, the total processing times representing Mt Home AFB went from the As-Is of 65:49 to the To-Be of 52:43 or a 20 percent reduction in total processing time.

Another approach for discussing deployment efficiency is the completion time of the first chalk and the additional time to complete each subsequent chalk. For the generic As-Is Air Force deployment processing, the first increment was completed in 18:53 hours with subsequent chalks

completed in a range of 1:33 to 2:39 and an average of approximately 2:02 hours additional completion time. For the generic To-Be Air Force deployment process, the first increment completion time was 17:14 with additional completion times ranging from 1:06 to 2:19, with an average of 1:51 hours additional completion time.

For Mt Home AFB home, the same analysis determined the 6-chalk completed time of 65:49 for the As-Is process decreased to 52:43 for the estimated To-Be process, for a 20 percent reduction in processing times. The increment completion time of 30:08 for the As-Is first chalk completion dropped to 24:06 for the To-Be, a reduction of 20 percent. The subsequent chalk completion times for the As-Is Mt Home AFB process ranged from 2:02 to 4:03 with an average of 2:57. In comparison, the To-Be subsequent chalk completion times ranged from 1:50 to 3:48 with an average of 2:54 hours. Within the Mt Home AFB simulations, the additional times to complete chalk 6 were significantly higher than for increments 2 through 5. These variations resulted from bottlenecks when moving increments from the units through the CDF and into the marshalling area. This was caused by the increased efficiency in increment preparation such that queues built up for cargo movement operations.

2.2.3.3 Impact provided by DPIs and Tools

A series of simulations developed to evaluate the impact of individual and combined started with the generic Air Force As-Is simulation. Using a building block approach, the impact of each selected improvement or group of improvement was measured by completion times for the 6 chalks, with the 6th chalk representing the total processing time.

With the results summarized in Table 12, simulation 0 represents the generic Air Force As-Is wing-level deployment process. Simulation 1 considers the use of BCAT to access site-planning information and to use that information to support the tailoring process. Building upon the capabilities in Simulation 1, Simulation 2 includes the concept using UTC-DT to support the tailoring process. To focus on just the impact of the UTC-DT use, this simulation did not consider the effects of the reduced resources being deployed because of the tailoring. Rather, the effect of the reduced resources being deployed was considered in Simulation 3. Simulation 4 considers the use of an automated tool for the generation of the DSOE. Simulation 5 added the capability to generate the load manifest using automated means based on bar coding as the

increments were developed. Simulation 6 combined a combination of proposed improvements to include the passive data collection to document processing status, to have in-transit visibility throughout the wing-level deployment processing, and process only selected increments through the CDF.

Table 12. Incremental Simulation Builds of the DPIs

| # | Simulation Setup | Chalk # | | | | | |
|---|--|---------|-------|-------|-------|-------|-------|
| | | 1 | 2 | 4 | 3 | 5 | 6 |
| 0 | Generic As-Is Air Force Simulation | 18:53 | 21:32 | 25:38 | 24:05 | 27:49 | 29:51 |
| 1 | Use of information from BCAT | 20:15 | 22:43 | 26:51 | 25:20 | 29:07 | 31:11 |
| 2 | Use of UTC-DT to support tailoring | 19:02 | 21:21 | 25:32 | 24:04 | 28:51 | 30:49 |
| 3 | Inclusion of tailoring results | 18:57 | 20:43 | 24:39 | 23:15 | 27:52 | 30:00 |
| 4 | Use of an automated DSOE generation tool | 18:30 | 20:18 | 24:16 | 22:51 | 26:28 | 29:35 |
| 5 | Use of an automated load manifesting capability | 17:52 | 19:51 | 23:29 | 22:37 | 25:27 | 27:32 |
| 6 | Use of passive collection to gain processing status Use of in-transit visibility Using the CDF to process only selected increments | 17:14 | 18:20 | 20:16 | 22:34 | 24:53 | 26:31 |

The results of these incremental simulations show a mix of processing time increases and decreases based on the changes made. In going from the generic As-Is to the simulation 1, the analysis of BCAT information was included, but the impact of the analysis results, such as reduced deployment footprint requirement, was not included. Consequently, the processing time increased due the extra analysis time involved. Adding UTC-DT to support the tailoring, the process time reduced on average approximately 1 hour and 20 minutes. By including the results of the tailoring process into the processing, the chalk and total processing time again reduced an average of approximately 1 hour. Adding the automated capability for DSOE generation and load manifesting continued to reduce the processing on average of approximately half an hour each. The final changes included in simulation 6 reduced chalk preparation time approximately an additional 45 minutes.

APPENDIX A
List of Acronyms

List of Acronyms

| | |
|----------|---|
| AB | Air Base |
| AF | Air Force |
| AFB | Air Force Base |
| AFI | Air Force Instruction |
| AFR | Air Force Regulation |
| AFRL | Air Force Research Laboratory |
| AFSC | Air Force Specialty Code |
| AIT | Automatic Identification Technologies |
| AOR | Area of Responsibility |
| ATO | Air Tasking Order |
| BCAT | Beddown Capability Assessment Tool |
| CDF | Cargo Deployment Facility |
| CINC | Commander-In-Chief |
| CMOS | Cargo Movement Operations System |
| CONOP | Concept of Operation |
| CONUS | Continental United States |
| DCC | Deployment Control Center |
| DoD | Department of Defense |
| DPI | Deployment Process Improvement |
| DSOE | Deployment Schedule of Events |
| EAF | Expeditionary Aerospace Forces |
| EFX | Expeditionary Air Force |
| EKB | Employment Knowledge Base |
| GTN | Global Transportation Network |
| HAZMAT | Hazardous Materials |
| HQ | Headquarters |
| IDO | Installation Deployment Officer |
| IDS | Integrated Deployment System |
| JCS | Joint Chiefs of Staff |
| LOG-AID | Logistics Analysis to Improve Deployability |
| LOGCAT | Logisticians' Contingency Assessment Tool |
| LOGMOD | Logistics Module |
| MAJCOM | Major Command |
| MHE | Material Handling Equipment |
| NCA | National Command Authority |
| PACAF | Pacific Command of the Air Force |
| PDF | Personnel Deployment Facility |
| PDS | Personnel Data Systems |
| QA | Quality Assurance |
| READY | Resource Augmentation Duty |
| RF | Radio Frequency |
| STEP | Survey Tool Employment Planning |
| TPFDD | The Time-Phased Force Deployment Data |
| TRANSCOM | Transportation Command |

| | |
|--------|---|
| UDM | Unit Deployment Manager |
| USAFE | United States Air Force Europe |
| UTC | Unit Type Code |
| UTC-DT | Unit Type Code – Deployment and Tailoring |
| WRM-CA | War Reserve Materiel-Capability Analysis |

APPENDIX B

Deployment Process Improvement (DPI) Descriptions

B-1 INFORMATION SYSTEMS

Implement a highly integrated task-receipt-to-airlift-manifest information system.

To optimize the operational effectiveness of deployment, the process must be based on a set of rules that minimize the information interpretation required by deployment personnel. Currently, one person produces a hard copy of information that is hand carried to someone else for manual entry into another system. The DPI concept would not only eliminate the manual information transfer but would also compute a first cut at information for each step in the deployment process. The decision maker would then review, adjust the information as necessary, and accept the information to have it sent on through the process. The information systems need some form of interfacing for the transfer of necessary information, with control over the ownership of pieces of information.

B-2 PROCESS

Maximize production and minimize inspection activities.

The goal of the deployment process within the perspective of the LOG-AID program is to prepare a dictated military capability, consisting of both cargo and personnel, and loading that capability onto a conveyance for deployment to a specified area. Therefore the critical elements of deployment are getting the cargo and personnel ready and loading those resources onto the conveyance. Since, both the personnel and cargo should not change between when they are prepared at the unit and when they are loaded onto the conveyance, the personnel and cargo should be able to go directly from the unit to the conveyance. This means that all activities such as the PDF (with the exception of the Chaplain) and the incheck and marshalling areas are being performed either because they are a convenience or because they are verifying and possible correcting aspects of preparation not completed at the unit level.

The DPI will be to remove all of these intermediate check and convenience points, leaving only those that truly reduce or benefit the deployment process. The one convenience point may be the chalk area, which acknowledges the receipt of the deploying resources and reduces the loading time of the conveyance once it arrives.

Capitalize on similarities between cargo and personnel.

While the personnel and cargo requirements are defined for each standard UTC, they are processed separately, with their first joining occurring during the load planning process. During the separated processing, individual information systems are used to process both personnel and cargo. However, in many ways there is little difference between the information tracking requirements between personnel and cargo. The goal, therefore, is to capitalize on the commonalties and build systems that address these common aspects. The differences between

personnel and cargo still have to be addressed but can be done in the common information system. This would reduce the information development and maintenance time, and possibly reduce the actual processing time.

Adjust the responsibilities and improve the integration of units, Manpower, and Personnel.

Personnel and Manpower remain the maintainers of the Personnel Data Systems (PDS) database but the UDMs must have direct access to the information. In this way, the UDM interface to the PDS could make a recommended selection for the UDM based on eligibility and present to the UDM the full list of those available with a notation indicating the persons eligibility and the computer recommended person. From this list, the UDM could make his final selection without direct interaction with Manpower and Personnel. Once selected, those names would be held in a temporary file and adjusted as other problems arise during the deployment requiring replacement selections. At the completion of the deployment, the manifest is automatically matched to the DRMD to confirm the final list, with the manifest being considered the most accurate document. This temporary file could then either be used directly to update the PDS database or given to Manpower and Personnel for them to update the PDS database.

Currently there is cyclic processing that occurs between Manpower, Personnel, and the unit. Within this process, Manpower and Personnel have two primary responsibilities. One, they are responsible for maintaining the personnel information database. Two, they are responsible for providing the personnel names possessing the necessary AFSC and skill, the personnel deployment eligibility status, and developing the travel orders for the deploying personnel.

The first problem is with the maintenance of the personnel database. At most sites the personnel database is not up to date even though the units have provided personnel change information. The lack of an accurate personnel database significantly reduces the usefulness of the information. Currently, many units have developed their own personnel databases which they keep up to date on a daily bases with very little effort once the initial loading has been completed. Because of this, the units usually do not pay any attention to the personnel information generated by Manpower and Personnel.

The second problem is that the units have, or could have all the information needed to generate the travel orders. Personnel could generate the common information associated with a UTC deployment and the unit could automatically generate the deployment orders as a by-product of the name assignments. Within the PDF and the unit, a tool would be necessary to adjust the travel orders as personnel changes are made during processing.

Collect deployment process status and effectiveness information using passive methods.

Provide a capability to passively collect deployment information that would provide process effectiveness information. This information would be summarized for the post brief and would guide modifications to the deployment training.

Control tasking receipts into the base.

Currently the taskings come from different places and is often received in different places. This communication problem is a result of the loosening of the standards defined in the regulations. Sometimes they receive taskings from their MAJCOM, sometimes from other commands, and sometimes from other services. Sometimes the tasking comes into the base to the battlestaff, sometimes the IDO, sometimes Manpower and Personnel, and sometimes the unit commander or UDM. It is highly recommended that the standards be more stringent on the flow of orders and taskings down through the Department of Defense (DoD) infrastructure. It should be through one command to the Wing Commander, and not the units or the IDO. This would help to minimize all the effort spent in validating various directions.

Better define the objective and criteria for UTC tailoring.

Through LOG-AID, the intent of UTC tailoring is to minimize the resources deployed to a reception site while retaining the capability to accomplish the designated mission. Currently, tailoring is viewed from two aspects that are sometimes conflicting. Current tailoring is often performed so as to fit the resources into the airlift provided for transport rather than to the mission requirements. Two, units vary in opinion as to whether or not tailoring should be done.

Reduce the number of coverage days included within the initial deployment.

With reduced deployment turnaround and with the implementation of Lean Logistics, the current deployment requirement for 30 days of supplies should be reducible to something less, possibly 20 days, thus reducing the amount of materials to be transported in the near term. This time period will be dependent on the resupply capabilities at the reception site location.

Improve in-transit visibility.

Currently there is a great deal of difficulty knowing where deploying resources are located during deployment, prior to employment.

With the passenger manifest generated and maintained electronically, the system can track the movement of resources and provide an accurate location and status of all personnel in the deployment process.

For cargo, the TCN is currently allocated to an increment number identified in the LOGDET. With this use of the TCN, any combining of pallets results in a discrepancy of what the transportation system believes is included in a TCN. In the future the TCN should be assigned to a pallet in the later stages of the process. With accurate information exchange they will know the actual cargo included in the TCN and not what the LOGDET stated should have been included in the TCN.

B-3 POLICIES

Refine the AFIs as necessary to best guide the deployment process.

The AFIs have been developed to allow significant site-specific flexibility from that provided in the previous AFRs. This flexibility appears to have benefited the deployment process in that sites have adjusted their implementations to better fit their needs, thus encouraging the site to have pride and ownership in their specific implementation. It appears, however, that this freedom of implementation diversity has demonstrated their similarities because independently the sites are developing many of the same operational requirements. As the LOG-AID program develops the "To-Be" base level deployment process, the current AFIs should again be tightened to control the process, but probably not be tightened to the AFR level.

Develop individual deployment guides for each deployment position.

These individual deployment guides would include detailed directions for how to perform a specific deployment position; directions for information to be received, generated, and transmitted; phone numbers for important points of contact; and pictures of various items such as pallets for use as future references. These guidebooks would provide two significant benefits. One, they would guide the individual when performing the deployment task. Two, they would provide an effective transition tool as augmentees transfer among augmentee positions or among bases.

Provide the UDM capability to produce more deployment-ready personnel and cargo.

UDMs are the key management positions within the base level deployment process. As key positions, they must have the skills necessary to accurately know when cargo and personnel are prepared for deployment so as to allow for the direct transfer from the unit to the transporting aircraft.

B-4 TRAINING

Apply real-world training characteristics to exercises.

While they usually practice in terms of satisfying a complete UTC, they are usually requested to supply bits and pieces of equipment and small numbers of personnel. This leads to the situation where the unit has to wait basically to the last minute to establish the packing and loading of the materials, and prevents

them from "leaning forward" in the preparation for deployment and forces them closer to a "just-in-time" type of deployment concept.

Maximize the training benefits.

Track personnel with deployment training as they move from base to base. This would help reduce the training requirements for the current deployment process and would further reduce the training requirements if the deployment process were more unified across bases.

Include total process training.

Currently, augmentees primarily receive training focused on specific segments of the process. During deployments, this focused training does not provide the insight needed to understand the impact a given situation can have on the overall success of the deployment process.

Incorporate a training and efficiency evaluation capability into the system provided to the various personnel associated with the deployment process.

Individuals primarily focused on would be the Load Planner and the UDM. The intent would have two levels of training. One level would be to have training scenarios that could be entered into the system allowing the personnel to practice. The other level would be to have testing scenarios entered into the system; the personnel perform the scenarios, with the results and possibly the grades presented back to the personnel. This training would help accomplish a uniform understanding, the lack of which currently causes some conflicts. Specifically, there are often differences of opinion among the various QA checkpoints as to whether or not an increment is acceptable. At times this difference of opinion concerns cargo acceptance, but the time required to clear up the difference may cause unacceptable delays.

B-5 PERSONNEL ISSUES

Develop a process to encourage augmentees to participate in deployments.

Augmentees are individuals working out of their assigned job responsibilities or AFSC to perform the various tasks supporting deployment operations. Because deployment operations are not defined as AFSC positions, augmentees do not necessarily receive augmentee credit towards their job performance valuation, which drive promotions and pay increases. Therefore, individuals are actually penalized in that they do not get credit for working as an augmentee while possibly being penalized for not completing their AFSC work in a timely manner. Establishing guidelines correcting this conflict within the award system would help improve the willingness of personnel to work as augmentees.

Develop a process to encourage all personnel to be committed to real world contingencies to the same level as exercises.

Exercises provide a media for training the deployment process, and for evaluating and rating the deployment readiness of units and bases. Therefore,

base resources and leadership focused on ensuring the success of exercises. In contrast, real-world contingency deployments are performed to get the job done, with limited involvement towards training or readiness ratings. Thus, base support resources and leadership attention are often less focused and supportive during a real-world deployment. Improvements would change leadership attitude to one of deploying like exercising such that ratings would be applied to real world contingency deployments.

APPENDIX C
Field Experiment Plan

1 INTRODUCTION

This document presents the Logistics Analysis to Improve Deployability (LOG-AID) Field Experiment Plan developed as the guide document for demonstrating and evaluating improvement concepts developed through the LOG-AID program sponsored by the Air Force Research Laboratory (AFRL). Initiated by the need to implement an Air Expeditionary Force (AEF) concept aimed at quickly deploying forces to operational sites, the LOG-AID program identified improvements for the wing-level deployment process. Working with deployment personnel at bases throughout the world, the wing-level deployment process was documented and analyzed to determine its strengths and weaknesses. From these strengths and weaknesses was developed a set of Deployment Process Improvements (DPIs) that built upon the strengths and corrected the weaknesses, with technologies selected or developed to implement some of the DPIs. The LOG-AID Field Experiment, as defined in this test plan, will test these improvement concepts and technologies in an operational environment to determine their true value. Development of those improvements and technologies demonstrating benefits will continue while those not demonstrating value will be terminated.

The need to improve the wing-level deployment process arose from the significant changes in world situations requiring military forces to react to a variety of mission objectives at many locations throughout the world. Military support requirements are changing from supporting large, major, long-term conflicts in a relatively predictable set of global sites to small, short-term conflicts and humanitarian missions at almost any point in the world. These changes in global mission requirements necessitate responsive and sustainable support. Thus, the traditional practice of using massive quantities of troops and large stockpiles of supplies available in-theater to engage hostile forces has become obsolete. Instead, agile and flexible support resources must be deployed along with the forces.

Because of these changes in world situations, Flexible Logistics and Agile Combat Support (ACS) – visionary concepts for the future of military logistics - have become important concepts in today's environment. To address these changing conditions, the United States Air Force (USAF) is embarking on a new set of initiatives under the banner of Global Engagement as

documented in Joint Vision 2010. These initiatives are the core competencies of Air and Space Superiority, Global Attack, Rapid Global Mobility, Precision Engagement, Information Superiority, and ACS. These core competencies support the AEF concept by providing the necessary military support for the changing global military requirements. Satisfying the operational goals of the AEF requires increased flexibility to address changing mission requirements, increased responsiveness, reduced deployment footprint, and reduced personnel and equipment to support the deployment operation.

The AEF concept directly impacts the deployment requirements placed on the deploying wing-level units. Units no longer have the luxury of long-range deployment planning, but rather must react to unanticipated deployment requirements within a shortened preparation time frame. To satisfy these requirements, the deploying unit must effectively and rapidly transition from their day-to-day training operations to their deploying operations, and they must effectively and rapidly accomplish their deployment processing, taking only those resources essential for the mission.

This Field Experiment Plan details the procedures of the experiment and is structured like a Test Plan with a given scenario, implementation procedures, metrics, data collection, and an analysis process contained within the document.

1.1 Deployment Process Description

Changes in the wing-level deployment processing timeline are required to meet AEF contingency deployment goals. For current deployments, the warning order arrives prior to the deployment order, providing sufficient time to perform a site survey and to update the readiness of equipment and personnel. When the deployment order arrives, the planning begins immediately for a 30-day deployment effort and is followed by the preparation and processing of personnel and equipment for transport.

Current AEF deployment timelines rely heavily on units being prepared and on standby for a designated 90-day cycle time in anticipation of a deployment warning and deployment order.

This greatly reduces the time available to perform a site survey and requires the designated units to operate as if they were deploying on a daily basis.

Future AEF deployment concept will focus on reducing the deployment timeline without requiring units to remain on alert and operate as if they were deploying. Meeting this reduced timeline will be achieved through the use of streamlined deployment processing supported by integrated decision support tools. These enhanced capabilities will enable units to respond with fewer deploying resources, thus reducing the time and effort required accomplishing the deployment.

To achieve the AEF deployment goal, the base-level deployment process was analyzed to identify ways of improving the process and achieving program goals of reduced deployment preparation time, reduced resources to perform the process, and reduced logistics footprint. Figure 1 and Figure 2 illustrate the changes made in the As-Is deployment process to produce a To-Be deployment process capable of achieving the AEF deployment goal.

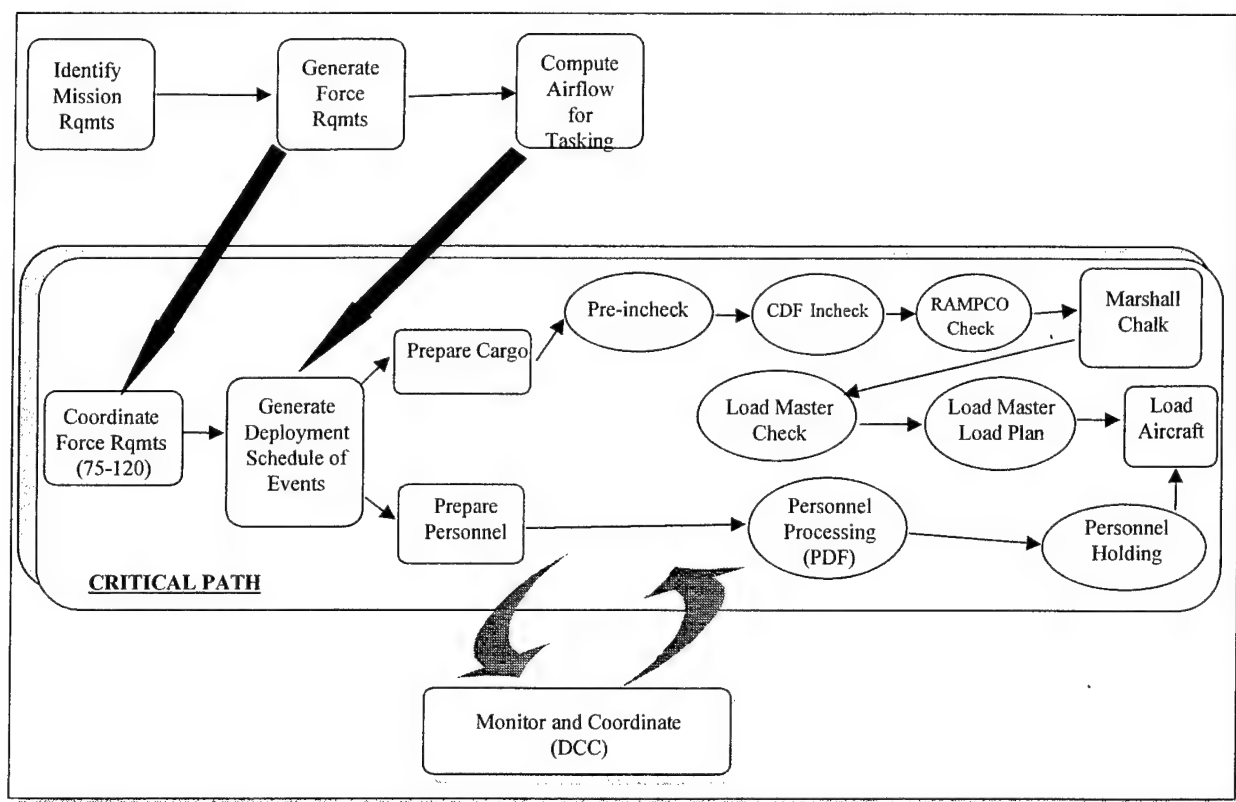


Figure 1. As-Is Deployment Process Overview

Under the current wing-level deployment process, the Force Requirements tasking order arrives concurrently at the Wing and USTRANSCOM (ref AFP 10-417) for airflow assignment. Airflow is determined by the standard Unit Type Code (UTC) information, number of aircraft needed the locations of the deploying units, and the arrival schedule as specified in the tasking order. In parallel with the assignment of the transport aircraft, the units identify the resources required for deployment and the Installation Deployment Officer (IDO) develops a Deployment Schedule of Events (DSOE) for the deployment.

Working in accordance with the DSOE, units prioritize and prepare their cargo and personnel for deployment, performing their own pre-incheck before releasing the resources for deployment. The cargo moves through a series of handling and inspection activities, with the Cargo Deployment Function (CDF) being the formal inspection. From the CDF, cargo moves to the marshalling area following its acceptance check by the Ramp Coordinator (RAMPCO), and

finally into the aircraft following its joint inspection with the loadmaster. Personnel processing occurs in much the same manner with inspection activities focused within the Personnel Deployment Function (PDF).

Within this process are areas for improvement for both the process and information flows. For the process flow, inspections and corrective actions occur from the time personnel and cargo leave the unit and that correct deficiencies initiated primarily at the originating unit. Therefore, the activities occurring between the unit and the aircraft loading do not alter the unit preparation, but rather correct it. Therefore, from a production perspective, these intermediate tasks represent non-value-added activities.

With respect to the information flow, the current deployment process involves a labor-intensive information processing structure. Included in this structure are a significant number of non-integrated information systems, duplication of information elements among many databases and manual tasks that are tedious and repetitive from one deployment to the next. Therefore, this information processing structure forces the deployment personnel to spend the majority of their time as information handlers rather than deployment processors and decision-makers.

In the To-Be deployment processing concept as represented in Figure 2, the tasking to the unit is controlled to allow units to prepare towards a formal tasking rather than their estimated tasking. Following tasking receipt, improvements in the planning and tailoring process allow the units to provide actual transport requirements in a timely manner for airflow assignment, thus helping to more effectively allocate their aircraft. Improvements in the tracking of their resource preparation status on a daily basis allows units to more quickly assign resources for deployment and thereby also reducing the time and effort to prepare those resources for deployment. Because units can more effectively prepare their resources, the need to process 100 percent of the resources through the PDF and CDF are unnecessary. Rather, the personnel can remain at the unit to assist in the deployment, and then move to a holding area for minimal time before moving to the aircraft when loading begins. Using a limited checking approach, increments move

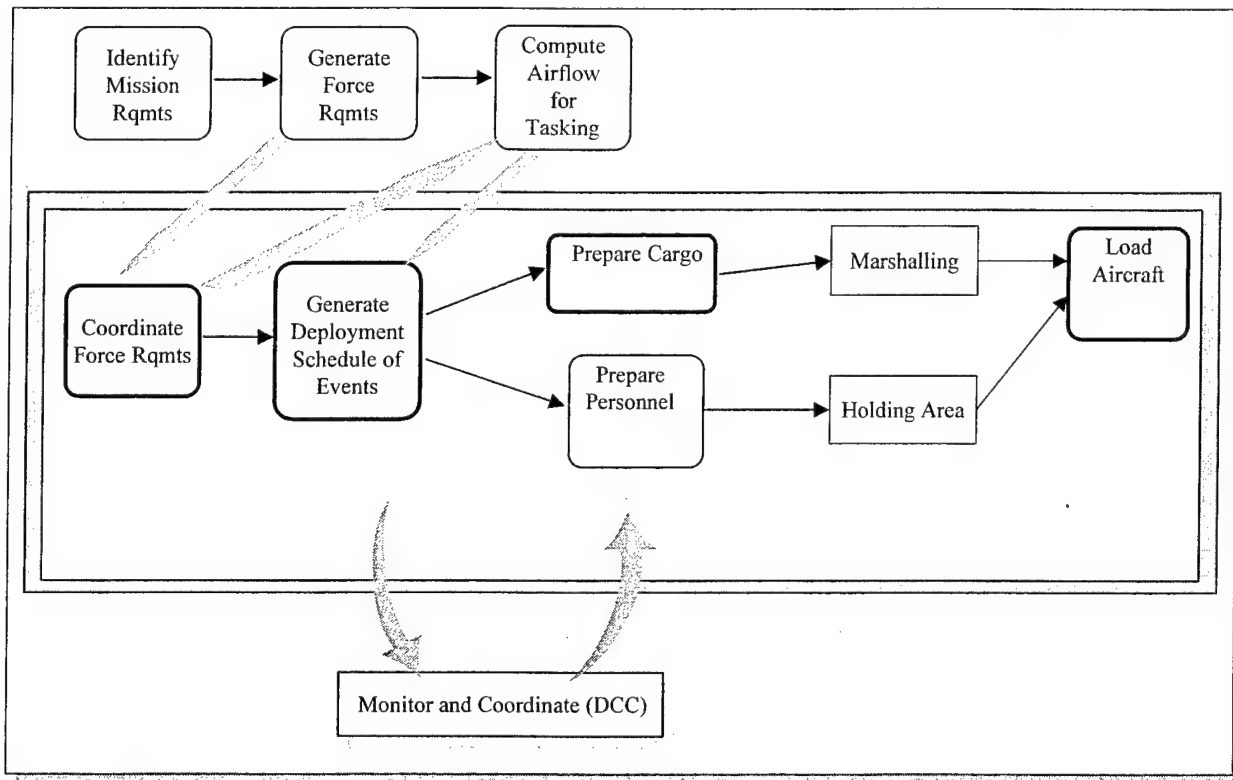


Figure 2. To-Be Deployment Process Overview

directly to the marshalling area, and possibly directly to the aircraft, thus improving the efficiency of the cargo processing.

1.2 Integrated Deployment System (IDS) Description

The IDS will be operational at Mt Home Air Force Base (AFB) for the LOG-AID Field Experiment and will play a critical capability for information processing throughout the wing-level deployment process. IDS is an umbrella system designed to streamline the deployment process by supporting the crisis action planning processes and deployment execution. IDS comprises the four systems identified as the Logistics Module (LOGMOD), Manpower and Personnel Module – Base Level (MANPER-B), Computer-Aided Load Manifesting (CALM)

system, and the Cargo Movement and Operation System (CMOS). The processing flow among these systems is represented in Figure 3.

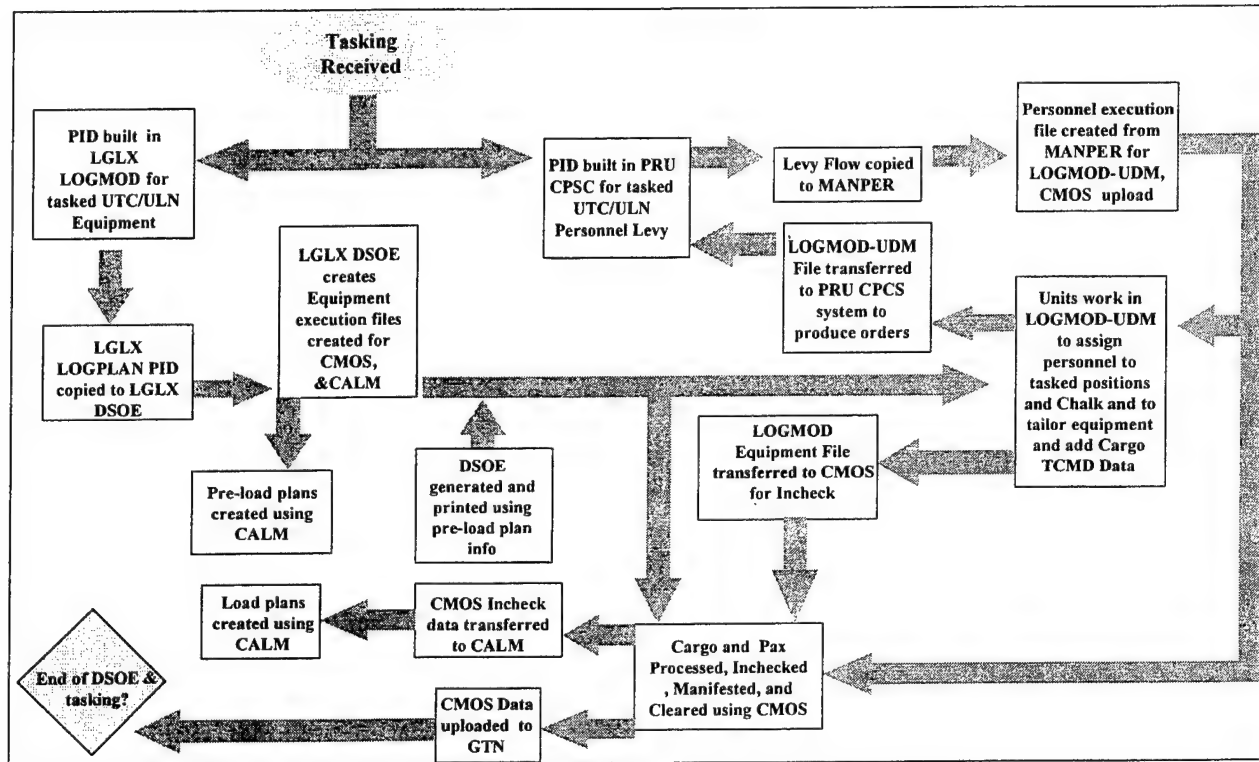


Figure 3. IDS Flow Chart

2 FIELD EXPERIMENT

The LOG-AID program identified a number of DPIs along with the development of computerized tools to support the implementation of some of these DPIs. The goal of the LOG-AID Field Experiment is to assess the value of these DPIs and their associated tools through implementation in a real-world deployment exercise. The primary criteria for this evaluation will be the total time to accomplish a deployment preparation, the number of supporting resources required to perform the deployment preparation, and the size of the deployment footprint.

2.1 DPIs Selected for Field Test Inclusion

Based on the LOG-AID Field Experiment implementation concepts, the DPIs selected for implementation are identified in Table 1 and correlated to the implementation steps. The ranking of the DPIs was accomplished approximately two years ago and was based on criteria provided by and weighted by wing-level deployment personnel. Additional implementation details are provided in the following paragraphs.

| CATEGORIES | RANK 1=high priority | Experiment Implementation | | | | | | | |
|--|----------------------|---------------------------|--|---------------|------------------|--------------------------------|-----------------|----------------|-----------------------------|
| Deployment Process Improvements | | SITE SURVEY GENERATION | CORRELATE SITE RESOURCES WITH MISSION REQUIREMENTS | UTC TAILORING | INC REMENT BUILD | STEAMLINE PERSONNEL PROCESSING | STEAMLINE CARGO | CARGO MOVEMENT | GENERATION OF LOAD MANIFEST |
| INFORMATION SYSTEM | | | | | | | | | |
| Implement highly integrated information system across levels of command, across and within deployment and reception sites to include a task receipt-to airlift-manifest information system | 1 | X | X | X | X | X | X | X | X |
| PROCESS | | | | | | | | | |
| Maximize production and minimize inspection activities | 2 | | | | X | X | X | X | X |
| Adjust responsibilities and improve integration of units, manpower and personnel | 3 | | X | X | | X | X | X | X |
| Capitalize on cargo and personnel processing similarities | 11 | | | | X | X | X | X | X |
| Collect process status and effectiveness information using passive means | 12 | | | | | | | | |
| Improve in-transit visibility | 13 | | | | | | | | |
| Control tasking receipts into the Base | 15 | | | | | | | | |
| Reduce the number of coverage days included for initial deployment | 17 | X | X | X | X | X | X | X | X |
| Better define the objective and criteria for UTC tailoring | 18 | X | X | X | X | X | X | X | X |
| TRAINING | | | | | | | | | |
| Apply real-world training characteristics to exercise | 8 | X | X | X | X | X | X | X | X |
| Maximize training benefits | 4 | X | X | X | X | X | X | X | X |
| Include total process training | 6 | | | | | | | | |

| CATEGORIES | RANK 1=high priority | Experiment Implementation | | | | | | | |
|--|----------------------|---------------------------|--|---------------|-----------------|--------------------------------|-----------------|----------------|-----------------------------|
| Deployment Process Improvements | | SITE SURVEY GENERATION | CORRELATE SITE RESOURCES WITH MISSION REQUIREMENTS | UTC TAILORING | INCREMENT BUILD | STEAMLINE PERSONNEL PROCESSING | STEAMLINE CARGO | CARGO MOVEMENT | GENERATION OF LOAD MANIFEST |
| TRAINING | | | | | | | | | |
| Incorporate training and efficiency evaluation capabilities into LOG-AID systems | 5 | X | X | X | X | X | X | X | X |
| POLICY | | | | | | | | | |
| Provide the Unit Deployment Manager (UDM) capability to produce more deployment-ready personnel cargo | 10 | X | X | X | X | X | X | X | X |
| Develop deployment guides for each deployment position | 9 | | | | | | | | |
| Refine the Air Force Instructions (AFI's) as necessary to best guide the deployment process | 7 | | | | | | | | |
| PERSONNEL ISSUES | | | | | | | | | |
| Develop benefits for augmentees performing deployment efforts | 14 | | | | | | | | |
| Encourage base leadership for the same level of commitment to real-world contingency deployments as is given to exercises. | 16 | | | | | | | | |

Table 1. DPIs Selected for Field Experiment Implementation

2.1.1 Site Survey Generation

Provides an automated capability that will reduce the need to send a survey team to the designated site. Allows one or more individuals at a designated site to collect resources and capability information and to retain and maintain that information in a centralized database for access by units over standard military communication networks. Implementation of the site survey generation is through the Survey Tool for Employment Planning/Employment Knowledge Base (STEP/EKB) tool set. STEP is the user interface capability allowing the surveyor to collect the site information, which is then stored and maintained in the EKB centralized database.

In preparation for a deployment, units will access the information in the EKB to support their UTC tailoring efforts.

| Site Survey Generation | |
|--|--|
| Objective | Metric |
| Reduce the number of people, and skill level required to perform the survey | <ul style="list-style-type: none"> • Number of people performing site survey • Skill level of personnel performing site survey |
| Increase the level of trust that units have on the site survey information without performing the site survey themselves | <ul style="list-style-type: none"> • Reliability of the information collected • Time in which survey can be performed |
| When an operational tasking occurs a site survey update can be generated and provided in a matter of hours | <ul style="list-style-type: none"> • Time in which survey can be performed • Time from site survey generation request until availability on the EKB database |

2.1.2 Correlate Deployment Site Resources with Mission Requirements

Determines a timeline when mission resources, such as fuel and munitions, will become depleted based on a specified mission profile. Knowing this resource depletion timeline, resupply efforts can be initiated to prevent impacts on the mission performance. Implementation of this improvement is accomplished by using the Beddown Capability Assessment Tool (BCAT).

| Correlate Deployment Site Resources with Mission Requirements | |
|---|---|
| Objective | Metric |
| Develop a profile for the quantity and amount of resources required at a location to support a designated operations tempo using BCAT | <ul style="list-style-type: none"> ▪ Time required to perform the analysis ▪ Number of personnel required to perform the analysis |
| Provide an alternative capability to identify changes in sortie definitions that more effectively use the available resources | <ul style="list-style-type: none"> • Impact the analysis will have on the supply pipeline scheduling |

2.1.3 UTC Tailoring

Adjusts the contents of a deploying UTC to include only those items necessary to perform the mission. This includes tailoring within a unit based on their past experience, tailoring based on knowledge of items available at the operational site, and tailoring based on the sharing of items among deploying units. Supported by the Unit Type Code – Development and Tailoring (UTC-DT) decision support tool, the basis for the tailoring support lies in the rules within the UTC-DT that specifies the interrelationships among the items within an UTC. If one item is identified for tailoring from the UTC, the rules identify the other items having a dependent relationship, therefore, making them likely candidates for tailoring as well.

| UTC Tailoring | |
|---|---|
| Objective | Metric |
| Reduce the time required to accomplish the tailoring effort | <ul style="list-style-type: none"> Time required to perform the tailoring Number of personnel record discrepancies |
| Minimize the skill level and experience base required to effectively and accurately perform the tailoring | <ul style="list-style-type: none"> Number of persons required to perform the tailoring Skill level of personnel performing the tailoring |
| Provide a more standardized way of accomplishing the tailoring | <ul style="list-style-type: none"> Level of tailoring coordination within as well as across units and bases |
| Provide a tailoring support capability encouraging interactions among units as well as considering the resources available at the operational site resulting in a reduction of total increments | <ul style="list-style-type: none"> Number of pallets Number of rolling stock increments Weight of increments Measurement of increments (Separated by powered non-power rolling stock, bins and pallets) |

2.1.4 Increment Build

Provides for the effective building of increments without relying on increment definitions as specified in standard UTCs. A standard UTC contains an established set of items that are packed on predefined increments for deployment. The tailoring of a standard UTC reduces the size of the UTC by identifying for deployment only those items needed to effectively meet mission objectives for a specific tasking. Reducing the items designated for deployment provides the opportunity to integrate items from the standard increment definition, and potentially reduce the number of increments required for deployment.

The integrated increment buildup will be supported by a scanning device that will relate items to increments in a real-time manner for tracking purposes and will require an increment design capability to efficiently and effectively build each pallet.

| Increment Build | |
|--|---|
| Objective | Metric |
| Provide the capability to quickly take information about items designated for placement on a pallet and design the layout of those items on the pallet | <ul style="list-style-type: none"> Time required designing and completing the increment build. Skill level of the increment builder |
| Record the list of items placed on the pallet for use in developing the load manifest | <ul style="list-style-type: none"> Items on each increment |

2.1.5 Streamline Personnel Processing

Streamlining the personnel processing relies in part on personnel records accurately reflecting the status of each individual and updated as changes occur. The receipt of a tasking order, therefore, will not initiate an effort to review and update those records. Rather, the receipt will

allow deploying personnel to check-in at the unit and quickly move from the unit to the holding area for a short stay prior to loading into the transport aircraft.

For the LOG-AID Field Experiment, current personnel identification cards will be used as the information vehicle. Contained on these cards as a minimum are the individuals' name, social security number, Air Force Specialty Code (AFSC), unit identification, and shot records. In the future, additional information will be contained on the cards, to include preparation status information for each of the stations currently existing in the PDF. The station information would include, for example, the shot records, will and financial preparation status.

Following notification by the unit, personnel will report to their units where their identification cards will be scanned to record their arrival and verify their deployment preparation readiness. The generated list of personnel will be sent to supply to initiate mobility bag preparation. For the Field Experiment, the personnel records for the deploying personnel will be reviewed by their unit prior to the experiment to represent the future goal of maintaining records on a daily basis.

As personnel load into the aircraft, the identification cards are scanned to verify the loading and the generation of the manifest.

| Streamline Personnel Processing | |
|---|--|
| Objective | Metric |
| Encourage real time maintenance of personnel records | <ul style="list-style-type: none"> • Time to process through unit • Number of personnel record discrepancies noted |
| Reduce personnel notification and holding area arrival cycle time by replacing PDF with a holding area | <ul style="list-style-type: none"> • Time required from notification to reporting to the holding area • Number of people notified • Number of personnel changes |
| Reduce the need to process personnel through the PDF by having the units responsible for personnel readiness. | <ul style="list-style-type: none"> • Time required to process personnel through the holding area • Number or percentage of personnel processed through the holding area. |

2.1.6 Streamline Cargo Processing

Streamlining the cargo processing requires that deployable increments are ready for loading on the aircraft once prepared by the unit. This assumes units have responsibility for the accurate generation of cargo.

Through this approach, the deploying increments can potentially be moved from the unit directly to the marshalling area.

| Streamline Cargo Processing | |
|--|--|
| Objective | Metric |
| Encourage the unit to accurately prepare their increments, allowing them to go directly to the marshalling yard thus eliminating the need for the existing CDF | <ul style="list-style-type: none"> • Time required to process increments through the marshalling yard • Number or percentage of increments processed through the marshalling yard • Number of discrepancies noted by marshalling yard |
| Reduce time for increments to be moved from unit to marshalling yard through the elimination of the CDF | <ul style="list-style-type: none"> • Time of increment movement from unit to the marshalling yard |

2.1.7 Cargo Movement to the Aircraft

Loading cargo into the transport aircraft generally occurs in two ways at Mt Home. Rolling stock (powered and non-powered) is moved directly to the aircraft and driven or pulled into the aircraft. Pallets and containers, in contrast, are placed on a K-Loader, usually with two or three K-Loaders cycling between the marshalling yard and the aircraft, to transport and load the pallets into the aircraft.

For the LOG-AID Field Experiment, the loading of the rolling stock will continue as currently done. For the pallets and containers, one K-Loader will be positioned at the aircraft and multiple forklifts will transport the pallets to the K-Loader for transfer into the aircraft. For the experiment, this use of multiple forklifts will simulate a pallet train for transporting from the marshalling area to the aircraft. This approach will minimize the use of K-Loaders for transport and optimize their use for loading and unloading.

| Cargo Movement to the Aircraft | |
|---|--|
| Objective | Metric |
| Increase the overall effectiveness of the loading process | <ul style="list-style-type: none"> • Percent busy of the load team within the aircraft • Speed of the aircraft loading |
| Decrease the need for Materiel Handling Equipment (MHE), especially the requirement for K-Loaders | <ul style="list-style-type: none"> • Number of K-Loaders used • Number of forklifts used • Number of tow vehicles |

2.1.8 Generation of the Load Manifest

The load manifest documents all the cargo and personnel loaded into the aircraft. As personnel arrive at the unit, their personnel identification cards will be scanned to record their names and

other necessary information. Similarly, the bar codes on the increments will also be scanned to record the buildup of the increments. Items will be bar coded prior to the experiment. This bar code represents the type, size and weight of each item. The increment bar code will identifies the size, weight of the increment as well as the type and number of items on the increment. This scanned information will be uploaded into LOGMOD within the IDS. From LOGMOD, the information is pushed to CMOS for the generation of the Load Manifest, which is then pushed to Global Transportation Network (GTN) to support resource tracking to the reception site.

| Generation of the Load Manifest | |
|---|--|
| Objective | Metric |
| Minimize the effort and resources required to generate the load manifest | <ul style="list-style-type: none"> Time to generate the load manifest |
| Reduce the errors and changes in the manifest throughout the processing efforts | <ul style="list-style-type: none"> Level of effort required to generate the manifest, specifically in terms of having to reenter information into a system. |

2.2 Automated Tools Selected for Field Test Inclusion

Additional LOG-AID analyses identified improvement opportunities focused at the reception planning level and resource availability for sortie performance. Information tools developed to address these improvement opportunities are STEP/EKB, BCAT and UTC-DT and a scanning device. An additional tool, WRM-CA has been identified to support deployment operations but will not be available to support the initial Field Experiment. A description for each of these tools follows along with a correlation between the tools and the typical deployment activities they support (see Table 2).

| EXPERIMENT IMPLEMENTATION | DPI TOOLS | | | |
|---|-----------|------|--------|---------------|
| | STEP/EKB | BCAT | UTC-DT | SCANNING TOOL |
| Deployment Preparation Activities | | | | |
| • SITE SURVEY GENERATION | X | | | |
| • CORRELATE DEPLOYMENT SITE RESOURCES WITH MISSION REQUIREMENTS | | X | | |
| • UTC TAILORING | | | X | |
| • INCREMENT BUILD | | | X | X |
| • STREAMLINE PERSONNEL PROCESSING | | | | X |
| • STREAMLINE CARGO PROCESSING | | | | X |
| • CARGO MOVEMENT TO THE AIRCRAFT | | | | X |
| • GENERATION OF LOAD MANIFEST | | | | X |

Table 2. Correlating Processing Activities with Software Tools

STEP (Survey Tool Employment Planning) is a software/hardware tool that supports the rapid, yet thorough, planning of logistics requirements for contingency operations. In simplest terms, STEP provides a medium for collecting in a multimedia type format, site survey information that describes infrastructure, resources, and capabilities information for potential beddown locations.

EKB (Employment Knowledge Base) is the information database holding the site survey information collected using STEP and supports the rapid planning of deployment/employment requirements for contingency operations.

BCAT (Beddown Capability Assessment Tool) is a software program that aids a planner in the identification of reception base capabilities to support a given scenario. BCAT uses a partial rule-based approach to allow the planner to adjust the planning factors for a given scenario. Not every element of the assessment is rule-based, and the software will only recognize specific types of rules for each area. This approach maximizes flexibility in assessing capabilities while minimizing the number of parameters that users must enter.

BCAT deals with a large amount of related information. The key groups of information used by BCAT are the assessment database, the site survey data, the knowledge base (rules), and Logisticians' Contingency Assessment Tool (LOGCAT) database. The user has complete control over the assessment database, limited control over the knowledge base, and no direct control over the site survey data or the LOGCAT database files.

UTC-DT (Unit Type Code – Deployment and Tailoring) is a demonstration software tool used by unit-level deployment planners to analyze equipment for a specific operational scenario and identify quantities needed to accomplish the mission. Information considered within the UTC-DT analysis include operational mission requirements, deployment site conditions and Limiting Factors (LIMFACs) and shortfalls identified by the BCAT assessments.

Bar Coding/Scanner – Technologies used to enter cargo and personnel information into information systems quickly and accurately. With bar codes attached to the cargo items and increments, the Palm Pilot will scan the codes and record which items are placed on which increments. For the bar codes on the personnel identification cards, the Palm Pilot will scan the cards to record those individuals deploying and relate the names to the database containing information currently maintained in the personnel folders.

WRM-CA – War Reserve Material-Capability Assessment (WRM-CA) is a software tool designed to track the War Reserve Material (WRM) available at sites throughout the world. By selecting a site, WRM-CA will list all the WRMs at that site. By entering a unique identifier for a specific item, WRM-CA will list the locations and the quantity available at that site. When fully implemented, WRM-CA will also allow for the allocation of the WRM to specific units and initiate the tasking of transporting the materials to the designated location.

2.3 Scenario

The LOG-AID Field Experiment scenario simulates the deployment of an AEF package for a 30-day mission to Decimomannu Air Base (AB), Italy. The package consists of 12 F-15Es from Mt Home AFB, 12 F-16C/Ds from Cannon AFB and aircraft support capabilities. With Mt Home acting as the lead unit and Cannon acting as the support unit, a joint tailoring effort will define the final set of resources needed to support the designated aircraft. Figure 4 represents the overall concept for the scenario, with details provided in the remainder of this section. Within this scenario, the activities specified for HQ USAFE and Decimomannu will be simulated prior to experiment execution, with Mt Home and Cannon actively participating.

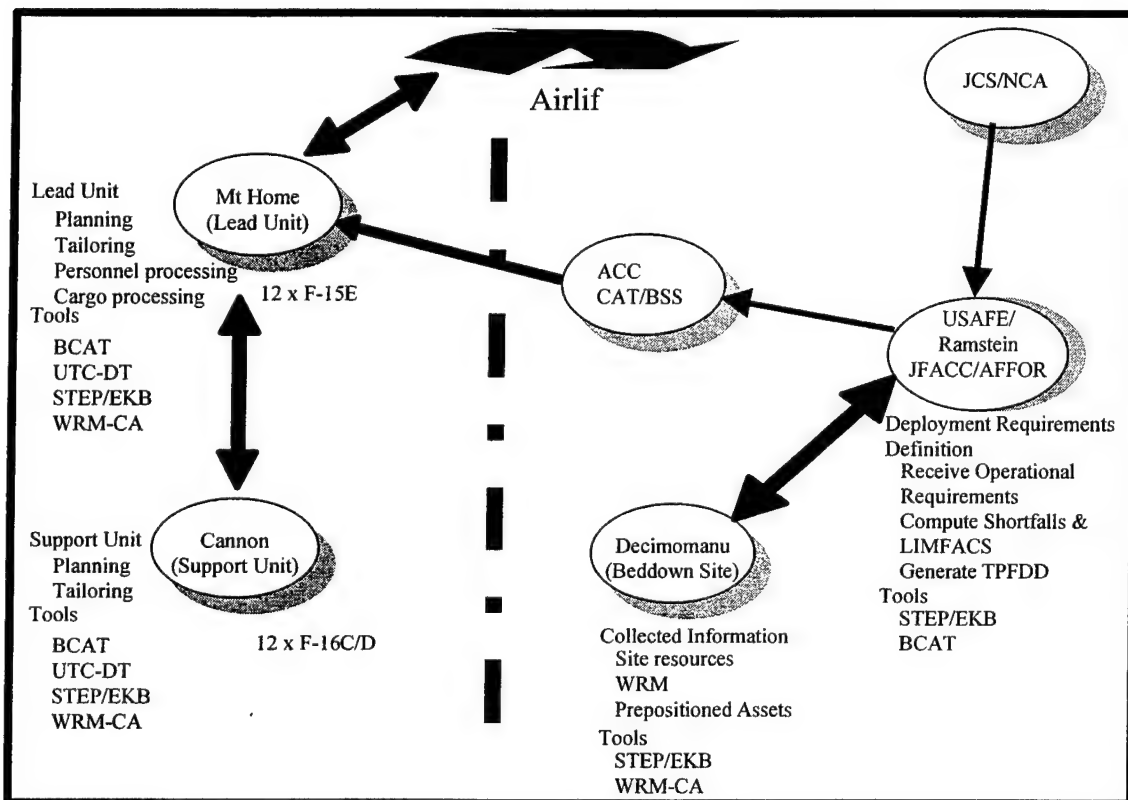


Figure 4. LOG-AID Field Experiment Scenario Overview

The operational requirements from the Joint Forces Air Component Command (JFACC) will be received by HQ USAFE at Ramstein AB and disseminated within the Air Operation Center (AOC). The planning cell within the AOC processes the Air Tasking order (ATO) and prepares it for transmittal to, in this case, ACC who in turn will task their Wing/Units. As part of the AOC Battlestaff, the LG function request an updated site survey for Decimomannu AB Italy. Using the site survey and ATO information, logistics planners will compute the operational LIMFACS and shortfalls for use in developing the Timed-Phased Force Deployment Data (TPFDD). The TPFDD will be validated by the Major Command (MAJCOM), in this case ACC, prior to formal release in Joint Operation Planning and Execution System (JOPES). Base deployment action begins at Mt Home and Cannon Air Force Bases when the Tasking Order is transmitted and received by the Wing Commanders (WOC/Battlestaff).

Once the tasking Order is received, unit level logistics planners at both Mt Home and Cannon will tailor their UTCs. This will be followed by a joint tailoring effort between Mt Home and Cannon that will consider the site survey information collected for Decimomannu. At the completion of the joint tailoring, Mt Home Log Planners specify to each unit the assignment of deployment responsibilities along with the allocation of reception site resources. Once Log Planners at Cannon have identified Wing level resources to be deployed as part of this package, their participation is Complete.

Using the tailoring results, Mt Home's IDO/DCC will begin initial DSOE development. Upon receipt of the Airflow assignment, the IDO/DCC will complete the DSOE and begin to prepare resources for deployment. Mt Home deployment preparation process will continue until the deploying resources are loaded into the aircraft. Throughout the Field Experiment, observers will collect the predefined metric data needed to determine the effectiveness of the DPIs and associated tools.

2.3.1 HQ USAFE at Ramstein AFB

For the LOG-AID Field Experiment, Ramstein's Battlestaff/Crisis Action Team will not play an active part in the development of the deployment requirements. If, however, they were to play a part, the following description would represent their responsibilities, ending by providing the MAJCOM, in this case ACC, the Force Requirements for this Scenario.

The Field Experiment will begin with predefined, simulated operational requirements and a Master Air Attack Plan (MAAP) to the Theater CINC, in this case HQ USAFE. In a real-world situation this tasking would come from the Joint Chiefs of Staff or National Command Authority (NCA). The operational tasking for this experiment will include the requirements for 12 F-15Es and 12 F-16C/Ds aircraft to be forward deployed to Decimomannu. HQ USAFE/LG will in-turn initiate a site survey request to LSS/LGLX at Decimomannu. The results of the site survey will be returned via the communication link to Wright-Patterson Air Force Base (WPAFB) server and placed in the EKB for future access as necessary. USAFE/LG will access and correlate the ATO with the site survey information from Decimomannu and determine, through analysis, the LIMFACS and shortfalls for the MAAP. Through the analysis, USAFE/LGLX provides appropriate inputs to the TPFDD, which is then, transmitted to the MAJCOM, in this case ACC and TRANSCOM. ACC selects Units to participate and then forwards the tasking to the Wing commanders at Mt Home and Cannon AFBs.

2.3.2 Decimomannu AB

As the designated AOR for the LOG-AID Field Experiment, the future concept would be to perform a site survey of Decimomannu using STEP to provide the identification of resources. The STEP information would be transferred to the EKB at WPAFB, to include WRM information. The requirement for a site survey would be received from Ramstein via phone or e-mail and a team local to Decimomannu would perform the survey. The results of the survey would be transmitted to the EKB for access later in the deployment process.

However, because Decimomannu will not play an active part in the Field Experiment, the site survey will be performed and the results loaded into the EKB prior to the experiment. This will

be performed as a joint effort between AFRL and TASC personnel. AFRL personnel will also assign WRM assets from a USAFE perspective using WRM-CA.

2.3.3 Mt Home

Mt Home deployment activities will be initiated with the receipt of the Executive Order excerpts from the TPFDD containing the 3FKM8 and 3FQKL UTCs, and the ATO in the WOC function that will activate the Battlestaff and inform the IDO. The IDO will activate the DCC who will be notified that the site survey information for Decimomannu is located in the EKB located on the WPAFB server. Based on the information received, the following parallel actions will be initiated:

- The IDO/DCC will use BCAT to identify shortfalls and LIMFACS at Decimomannu. In the future, the IDO could also review such tools as WRM-CA to determine which assets have been assigned for their use and considered within the tailoring process using UTC-DT.
- The IDO/DCC will pass the UTC tasking and BCAT analysis information to the appropriate UDMs.

The UDMs will use UTC-DT to access the list of items contained in their assigned UTC. Starting with this information, the UDM will perform an initial tailoring of the UTC based on the site survey from Decimomannu, the operational requirements specified in the ATO, and the results of the BCAT analysis.

Mt Home's IDO will contact Cannon's IDO for a joint tailoring effort. The goal of this joint effort is to identify those UTC assets that are common between the units and are already available at the AOR site. Based on the identified common items, the Mt Home IDO, with inputs from the UDMs, will assign deployment responsibilities for the common items. At the completion of the tailoring, Cannon's part in the Field Experiment is completed and Mt Home will continue with processing the selected resources identified for deployment from Mt Home.

Mt Home's Load Planner will estimate the transport requirements and generate an airlift request. While the airlift is being computed, the following events will occur in parallel before the units begin actual resource preparation.

- The Log Planners will determine the priority of the cargo, and will assign cargo items to increments and increments to chalks. This information will be provided to the Load Planners for the development of the preliminary load plan using CALM and based on the standard C-141 aircraft.
- The Mt Home IDO will develop the preliminary DSOE within the IDS.
- The UDMs will assign names to spaces for personnel. The goal, which is included in LOGMOD, is for the UDM to have direct access to the information in the Manpower and Personnel databases needed to make effective deployment assignments. Since the UDM has all the decision-making information, the personnel selection is made without cycling information back through the Manpower and Personnel offices. The UDM inputs the selected names in LOGMOD for access by Manpower and Personnel for development of deployment orders.
- The Unit's will assign the equipment necessary to satisfy mission requirements. With the equipment and materials identified for deployment, units will be notified to start cargo preparation for deployment. Production Superintendent will identify the aircraft for deployment.

Upon receipt of the airflow through GTN, the Mt Home LOG planner will finalize the DSOE and notify UDMs of its availability in LOGMOD. The Load Planner will update the load plan in CALM if necessary.

Based on the DSOE, the UDMs will notify the selected personnel to arrive at the unit at a designated time. In the future concept, all arriving individuals will have the bar codes on their identification cards read using a scanner. For the Field Experiment, the names of 10 to 15 individuals will be selected within a unit and their names pre-entered into the scanner's database.

After scanning their identification cards, the information will be uploaded to a computer to demonstrate the effectiveness of the transfer capability. Once uploaded, any discrepancies will be identified to the individual.

To accomplish the goal of reducing the deployment logistic footprint, units will strive to reduce the number of pallets deployed by maximizing the quantity of items placed on each pallet. In the future, an automated pallet buildup design capability will exist that will take the list of prioritized items for deployment and design a buildup structure for the pallets. The pallet design will provide minimally trained personnel the capability to effectively generate flight-ready pallets. To simulate this future concept, an expert pallet build team will be placed at the unit to effectively organize the deploying items onto the increments. The time required for the skilled team to build effective pallets will be taken as an estimate of the time required to design and build the increment using the pallet optimization tool and the minimally skilled build team.

As increments are built, the scanner will be used to read bar codes that will associate the items placed on the pallet. This procedure will also identify those increments containing hazardous materials, triggering the generation of the hazardous material documentation, and identifying those individuals authorized to sign the hazardous material documentation. Once completed, the increment database will be transferred to LOGMOD for the generation of the load manifest. This use of the bar coding and scanner will be used on approximately 10 increments. In preparation for this portion of the Field Experiment, bar codes will be attached to the selected items and increments containing those items. The selected increments will include pallets, bins, and rolling stock.

A future goal is to move cargo directly from the unit to the marshalling area, thus eliminating the time and resources used within the CDF. It will be necessary for the increments to pass through a centralized weighing and measurement point, with the weights and measurements represented as being electronically entered into CALM to update the load plan.

Similarly, deployment concept will move personnel directly from the unit to a short term holding area prior to their loading into the aircraft, thus eliminating the PDF. Within the holding area,

deploying personnel will receive mission briefings, travel orders and other deployment related information. For the LOG-AID Field Experiment, the personnel and chalk relationship will be entered into the scanner. Scanning of identification cards upon arrival at the unit, allows UDM's to update the chalk manifest and quickly identify any missing personnel.

Materials for mobility bags are retained in supply at Mt Home and used to build mobility bags for deploying individuals. Triggering the preparation of the mobility bags will be the sending of names for the deploying individuals immediately after being selected by the UDMs. Supply will then prepare the bags, build the mobility bag increment, and ensure the increments are delivered to the marshalling area.

Personnel will move directly from the holding area to the aircraft at the designated time. As they enter the aircraft, their identification cards are again recorded using the scanner, with the results automatically compared to the planned list and a hard copy of the Passengers (PAX) manifest generated. It is the responsibility of units to ensure their personnel are fully prepared with shots and other requirements. If the situation exists that requires a unique shot for the deployment, a centralized station could be established in the holding area, but the process should not be developed around exceptions to correct a lack of preparation by the units.

The effective transfer of the increments from the marshalling area to the aircraft will be measured by the efficient use of the MHE and the percent busy of the load team. Rolling stock will be moved to and from the aircraft as currently done. Pallets and bins will be loaded by positioning a K-Loader at the aircraft with trains of pallets and bins delivered to the K-Loader. For the experiment, the train will be simulated by positioning the pallets and bins close to the aircraft and using enough forklifts to keep the K-Loader and load team busy.

2.3.4 Cannon AFB

Cannon AFB will be responsible for providing 12 F-16C/D aircraft and the UTC support resources as defined with Mt Home. Cannon's portion of the LOG-AID Field Experiment will initiate with the receipt of their tasking and terminate with the joint tailoring effort.

The standard UTC for deploying the F-16 C/D aircraft from Cannon will be 3FKM8. Once that tasking is received Cannon's Deployment Control Center (DCC) (LSS/LGLX) will notify the unit UDMs. The UDMs will contact the individual responsible for identification of unit resources needed for deployment. Using UTC-DT, this person will access the standard UTC information from LOGMOD and tailor those items based on the UTC-DT predefined rule base and knowledge of the AOR.

When contacted by Mt Home's Log Planners a joint tailoring effort will be performed by the UDMs at the two locations. Included in the discussion will be a list of resources known to be available at the reception site as identified through the site survey. Using the initial UTC tailoring results as the basis, the UDMs will use the collaborative capability of the UTC-DT tool to identify common items among the units and the items already located at the AOR. For each common item, the UDMs will determine the possibility of sharing that resource, and if so, assigning the deployment responsibility for that item. Once these actions are complete, Cannon's participation in the experiment is complete.

Completion of the joint tailoring process identifies the Field Experiment completion for Cannon.

2.4 Communication Links Infrastructure

For the LOG-AID Field Experiment, the information flow represents a critical part of the improvement concepts. The information flow among the various sites is presented in Figure 5 as an overview perspective. The following subsections describe the communications' infrastructure and the flow of this information through the infrastructure at the various sites.

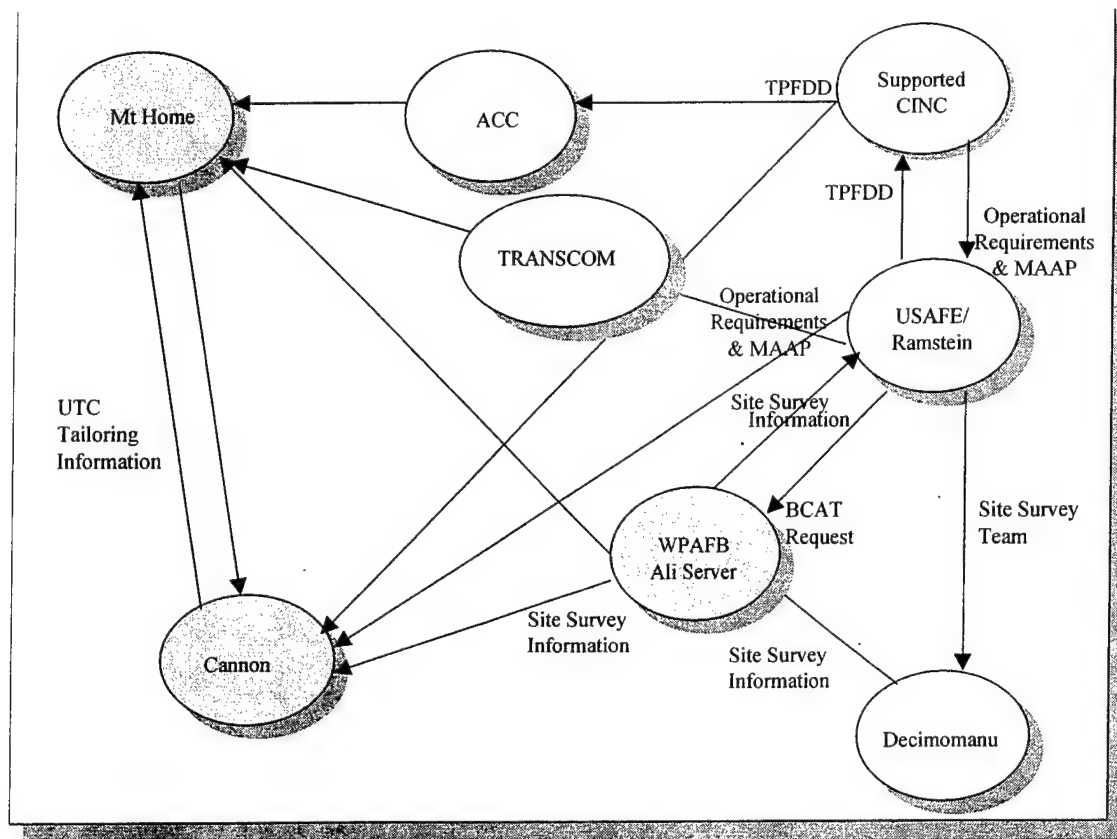


Figure 5. Information Flow Overview

A standard communications structure has been directed to be in place Air Force-wide, with some variations existing among bases due to upgrade status and the uniqueness of the base. As a starting point in establishing the communications structure for the LOG-AID Field Experiment, the standard communications infrastructure for bases is represented in Figure 6.

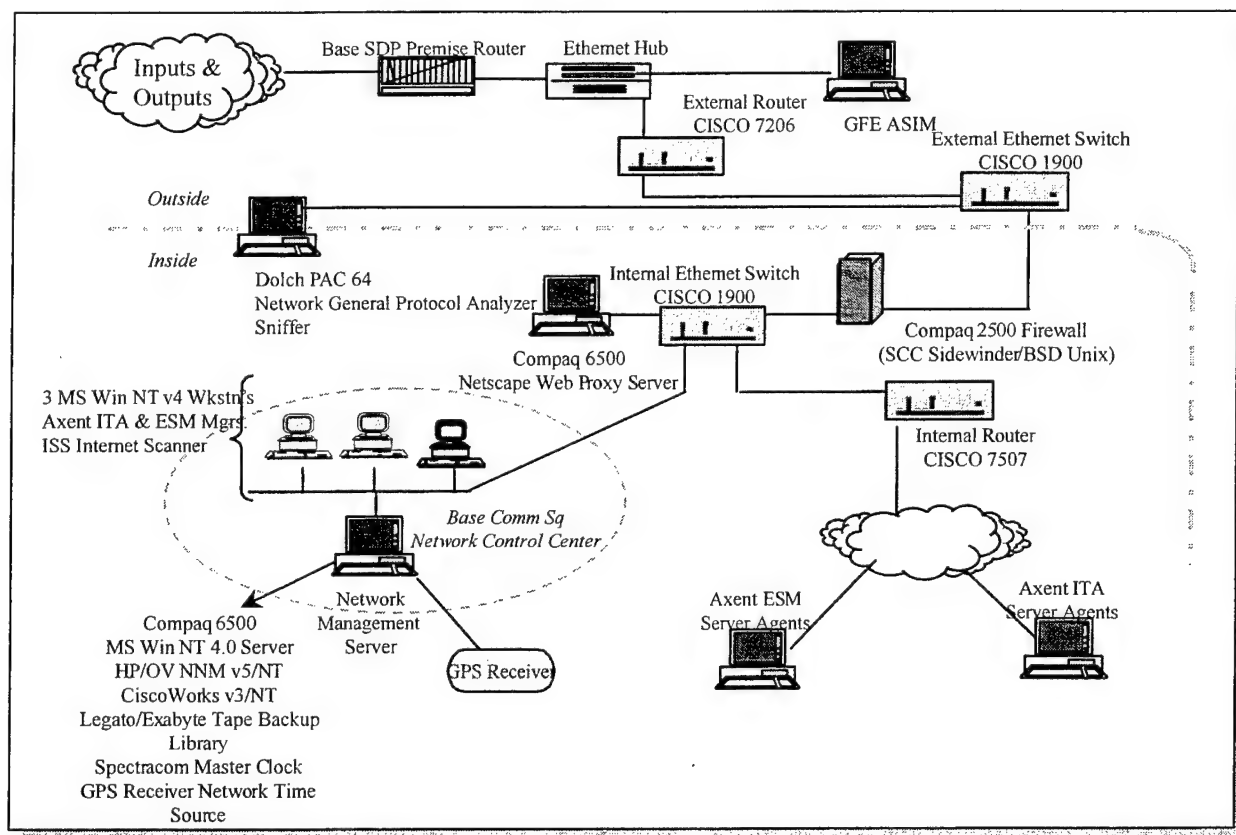


Figure 6. Standard Base Communications Infrastructure

Typically, a long-haul circuit (such as a T-1 with 24 voice channels and an aggregate 1.544 Mbps bandwidth) enters the base at the Service Delivery Point (SDP), which is located in the Network Control Center (NCC). From the SDP, a 10BaseT connection links the T-1 circuit to a hub, with a 100-megabit connection to the external router (CISCO 7206 Proxy Server). From here, there is another 100-megabit connection to an internal switch, then another 100-megabit connection to an integrated Domain Name Server (DNS)/firewall. After another internal switch, there is another 100-megabit connection to the internal router (CISCO 7507).

There is also an OC-3 connection to the Asynchronous Transfer Mode (ATM) backbone, with another OC-3 connection to the base Local Area Network (LAN). On the LAN, the numerous base servers are interconnected via fiber optic circuits in a star topology (multiple ports).

Current plans call for using the IDS, linking the Deployment Management System (DeMS), MANPER-B, LOGMOD-B, CMOS, and CALM. Not all components are currently functional at all bases. For those bases not having the functional IDS, Automatic Digital Network (AUTODIN) provides a communications' system incorporating error detection techniques and high-speed transmission. AUTODIN itself is soon to be replaced with the state-of-the-art Defense Messaging System (DMS) shortly.

The DMS will provide a DoD-wide, desktop-to-desktop, secure multi-media messaging and directory service. It modernizes Command and Control (C2) messaging capability by allowing multi-media attachments and providing messaging infrastructure for the C2 Intranet. It also decreases Government development costs through increased use of Commercial, Off-the-Shelf (COTS) products.

The NCCs are developing a migration plan to move DMS connectivity out of the telecommunications centers and onto desktops of all organizational users. Beginning in August 1999, all AFBs will have fully commissioned DMSs operating at a Secret level and at what is known as the "sensitive but unclassified" levels. Based on the DMS implementation schedule, closure of DoD's AUTODIN Switching Centers is scheduled to shut down on December 31, 1999.

Coordination of LAN access at the selected bases in support of the LOG-AID tool implementation for the Field Experiment will be through the NCC personnel, as they are the focal point for all network and/or communication systems infrastructure issues.

2.4.1 WPAFB Communications

WPAFB will host the EKB on the Ali server located within the AFRL facility. The information placed in the EKB will be unclassified for the LOG-AID Field Experiment. Therefore, to facilitate the communications links to Ali from the other bases, the Ali server will be shunted into the WPAFB communication structure so that it will remain outside the firewall as represented in Figure 7.

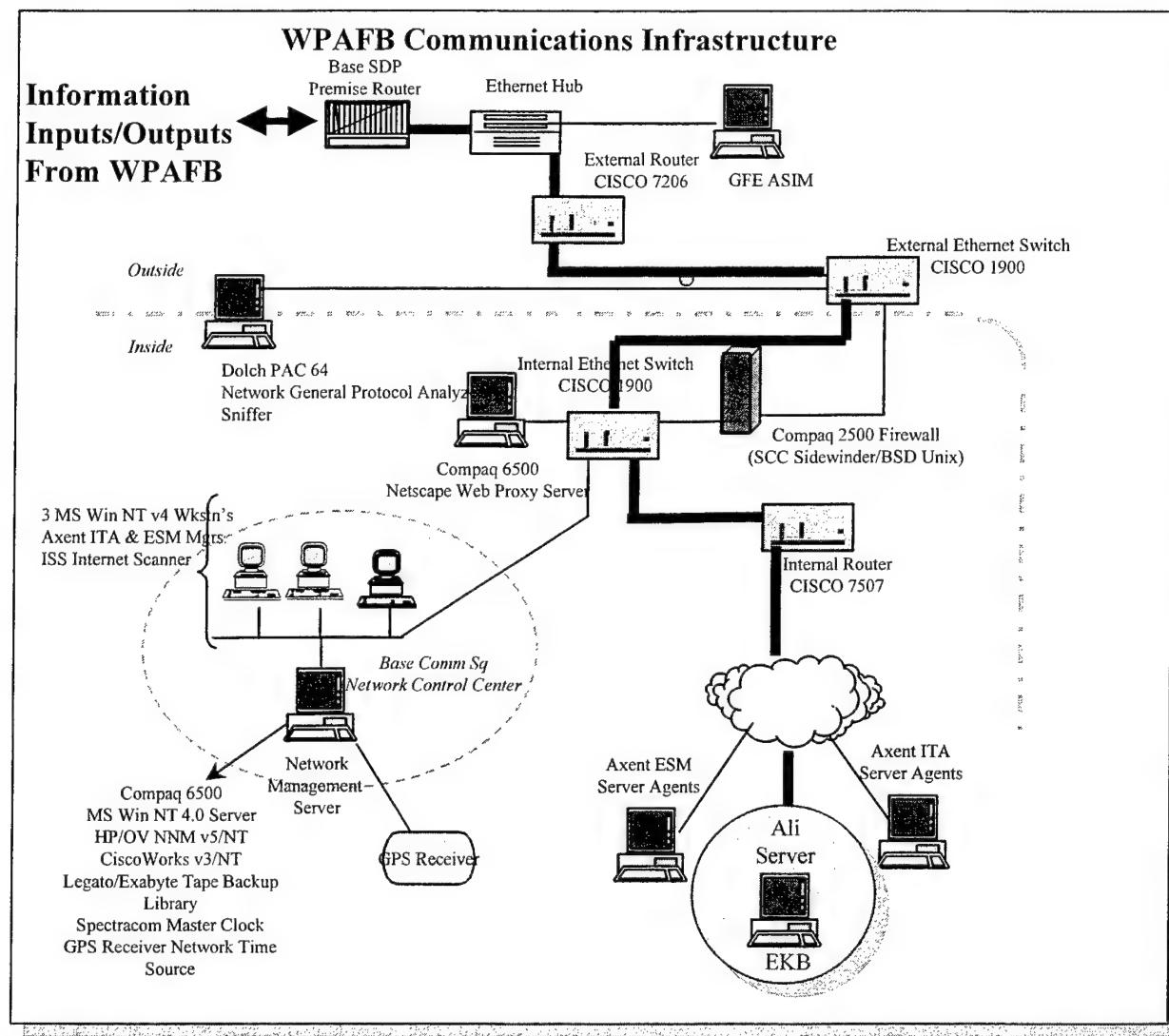


Figure 7. Access to the EKB Hosted on the Ali Server at AFRL/WPAFB

2.4.2 Communications Structure at Mt Home AFB

The Mt Home communications network is represented in Figure 8 and will be able to support the necessary connections for the BCAT and UTC-DT tools. The ATO and Tasking Order from Higher HQ and/or Ramstein AB would arrive at the Wing Command Post via AUTODIN or Global Command and Control System (GCCS). The Command Post personnel would authenticate and review the ATO and notify the IDO to report to the Command Post to review the classified message.

Mt Home only has a T-1 line going off the base over the NIPRNET. It can handle any bandwidth until it gets full and is currently about 80 percent used and will get slower with additional traffic. Within their current network are some systems linked outside the firewall. However, Mt Home is currently justifying having those systems linked in that manner, meaning that linking the LOG-AID Field Experiment tools will have to go through the fire wall as represented in Figure 8. Mt Home does not have the capabilities to measure communication flow. Therefore, the observers will be responsible for measuring the flow based on the sent and arrival times.

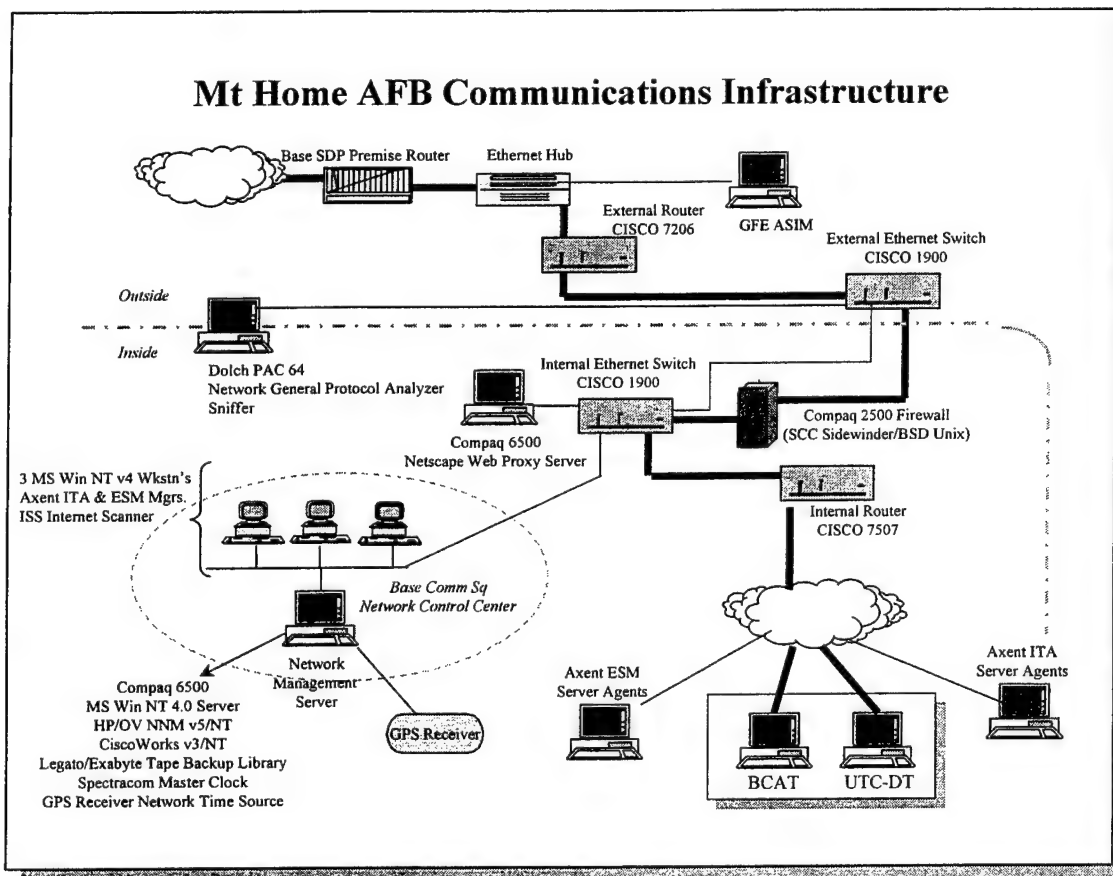


Figure 8. Mt Home Communication Structure

Accomplishing the necessary links within Mt Home is possible in a few hours after the necessary information is provided the communications personnel. In turn, Mt Home will provide the same type of information to WPAFB to complete the communication link. The necessary information is the following:

- IP address and port connection into WPAFB to access the EKB
- Protocol of the information arriving at Mt Home
 - SGL
 - FTP

2.4.3 Communication Structure at Cannon AFB

The 27th CS will provide access to the needed information via an Access Control List (ACL) entry to the DNS/firewall.

Due to the planned implementation schedule, the AUTODIN will provide the basis for Cannon's LOG-AID Field Experiment communications network with the base-level LAN standard being Windows NT and Microsoft Outlook 98.

2.5 Experiment Implementation

The LOG-AID Field Experiment evaluates the effectiveness of the proposed operational concept for the wing-level deployment process, and assumes an operational IDS capability at Mt Home. The experiment will be included as part of the chalk walk planned for Mt Home AFB, with flexibility within the chalk walk to satisfy the requirements of the experiment.

The experiment will use the 3FQKL UTC at Mt Home AFB and the 3FKM8 UTC at Cannon AFB. The major players in the experiment will be the 391st Fighter Squadron and the 366th Component Repair Squadron (CRS), Equipment Management Squadron (EMS), and Supply Squadron at Mt Home. Based on information currently available, the contents of the 3FQKL0 UTC at Mt Home are presented in Table 3. The collection of metrics for the 3FQKL0 UTC

processing will focus on approximately 10 increments (5 pallets, 2 bins, and 3 rolling stock) and approximately 40 personnel.

| SQ | Flt | Pallets | ISU 70 | ISO 90 | Rolling Stock | Others |
|--------------|----------------|---------------------------|---------------|---------------|----------------------|---------------|
| 391FTRS | | | | | | |
| | Sortie Support | 3 | 3 | 2 | 2 | |
| | Life support | 2 | | | | 2 |
| | Sortie Gen | | | | 1 | 2 |
| | OPS | 1 | | 3 | | |
| 366EMS | | | | | | |
| | AGE | 2 | | | 52 | |
| 366CRS | | | | | | |
| | Prop | | | | 2 | |
| | Accessories | | | | 2 | |
| | Avionics | Only if data link deploys | | | | |
| 366Sups | | | | | | |
| | Combat Ops SPT | *7 | | 6 | | |
| TOTAL | | 15 | 3 | 11 | 59 | 4 |

*may not take 3

Table 3. Contents of the 3FQKL0 UTC

Prior to the experiment execution, the following preparatory actions will occur:

| Field Experiment Preparatory Actions | | |
|--|------------------------------|----------------------------|
| Action | Point Of Contact | Completion Time |
| Identification of an expert increment buildup team. | Synergy, Inc. Mt Home/DCC | 1 Week Prior to Experiment |
| Development of the site survey information. With Decimomannu AB designated as the reception site, site | Synergy, Inc | 1 Week Prior to Experiment |

| | | |
|--|--------------|----------------------------|
| survey information will be generated and placed in the EKB. | | Experiment |
| Identification of the LIMFACS and shortfalls at Decimomannu will result from an analysis using BCAT based on the ATO and the site survey information | Synergy, Inc | 1 Week Prior to Experiment |
| Development of the deployment tasking that will be manually handed to the appropriate personnel, along with the Execution Order and the ATO, as opposed to being placed in the system as is currently done. | Synergy, Inc | 1 Week Prior to Experiment |
| Identification of WRM and its loading into WRM-CA | Synergy, Inc | 1 Week Prior to Experiment |
| Identification of the approximate 40 individuals who will be used to test the scanning capability. Their names and basic information will be entered into the scanner and associated to a chalk within the scanner database. | Synergy, Inc | 1 Week Prior to Experiment |
| Identification of 10 increments from one unit that will be used to test the scanning capability. For these increments, bar codes will be attached to the pallet, bin, or rolling stock as well as to the items included in those increments. This information will be entered into the scanner database. | Synergy, Inc | 1 Week Prior to Experiment |
| Items from two standard pallets and within one unit, not to include the 10 selected for the scanning test, will be selected and set aside for packing onto an integrated pallet | Synergy, Inc | 1 Week Prior to Experiment |

In the Field Experiment, the deployment process will be executed as a set of controlled steps, providing the opportunity to repeat step performance as a way of adjusting for identified problems or trying alternative approaches. The process steps will be defined such that through the post-experiment analysis, the collected metric information will fit together to provide

performance effectiveness evaluation for the total process and be comparable to the current deployment process used as the baseline.

The major steps for the LOG-AID Field Experiment, as represented in Figure 9, are planning, cargo preparation, personnel preparation, cargo movement, personnel movement, and aircraft loading. Within each major step will be sub-steps. During the Field Experiment, each experiment step or sub-step will be performed by providing a short training session for the augmentees and observers during which the goals and experimental process will be explained. The training session will be followed by a dry run and finally the actual experimental run.

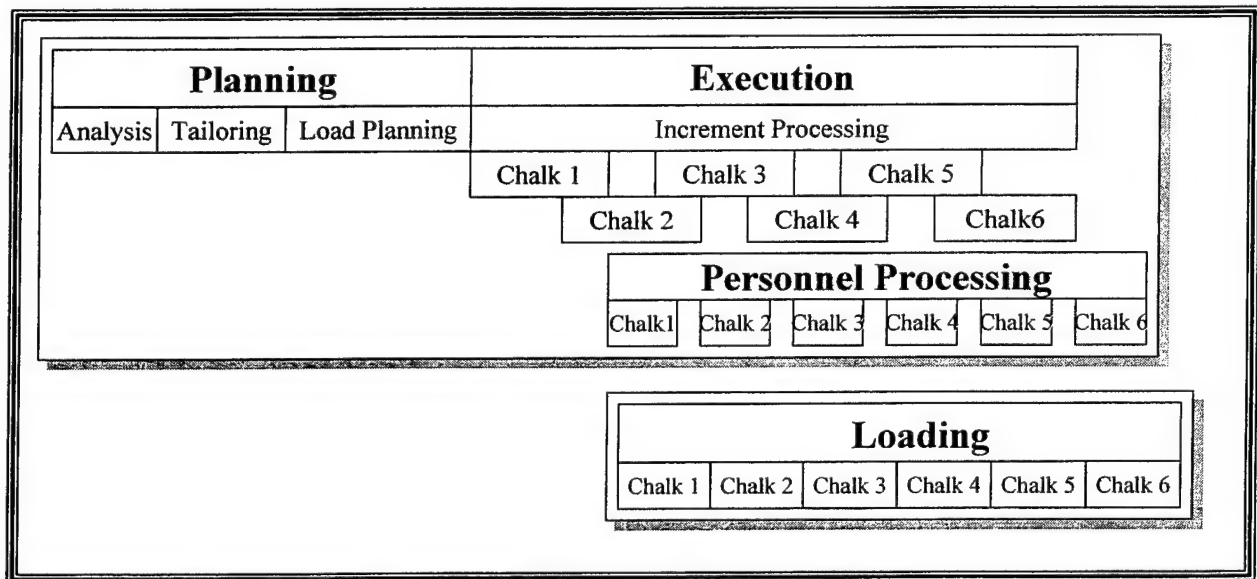


Figure 9. Major Processing Steps for the LOG-AID Experiment

2.5.1 Planning Implementation

The planning phase will begin with the receipt of the tasking defining the UTCs to be deployed and the mission to be accomplished, and end with the completion of the DSOE.

2.5.1.1 Analysis

Analysis will focus on identifying the items required to execute the deployed mission success. Performed in parallel by using BCAT at both Mt Home and Cannon AFBs, the analysis effort relates the mission definition as provided in the ATO to the site survey information and to the UTC tasking assignments. Resulting from relationship analysis will be the LIMFACS and shortfalls existing at the operational site.

2.5.1.2 Tailoring

Tailoring will involve several major steps – tailoring within the units and tailoring between units at Mt Home and Cannon AFBs, and tailoring based on resources available at the reception site. The primary inputs for tailoring will be the mission definition as defined in the ATO, the UTC tasking assignments, the BCAT analysis results, and the site survey information.

At both Mt Home and Cannon AFBs, the following step will occur in parallel. Each unit will be notified of their UTC tasking by the IDO and will tailor their standard UTC items using UTC-DT based primarily on past experience. Using site survey information, each unit will use UTC-DT to determine the availability of resources at the reception site and to tailor out those resources from their UTC. This will complete the first tailoring step.

As the lead unit, the Mt Home IDO will contact the Cannon IDO to set up a combined tailoring session. Session attendees will include, for both bases, the IDOs, UDMs from the tasked units, and unit personnel responsible for unit tailoring. Using the collaborative tailoring capability within UTC-DT, the combined tailoring will focus on identifying items common to two or more units. When common items are identified, a group decision will be made for whether or not a duplicated item can be shared. If sharing is possible, the assignment for the deploying item will be made. Through UTC-DT, any associated items will be identified and tailored out.

For Mt Home, the resources identified for deployment using UTC-DT will be transferred from UTC-DT to LOGMOD as the starting point for planning.

2.5.1.3 Load Planning

Load planning works on the list of resources for deployment resulting from the tailoring effort. Starting with the prioritization contained in the standard UTC definition, the units will refine the prioritization based on the specific requirements of the mission. The prioritized list of deploying equipment will be allocated to increments, resulting in a prioritized set of increments. Using standard weights, assignments of increments to chinks will be made and the increment weights entered into CALM for the generation of the initial load plan. With the chinks identified, the DSOE will be developed.

2.5.2 Deployment Preparation

Personnel and cargo are prepared in parallel during this phase of the wing-level deployment process.

2.5.2.1 Personnel Preparation

Based on the requirements stated in the tasking and adjusted through tailoring, the UDM for the selected unit will assign individuals to fill required deployed spaces. The assignment of the ten selected individuals will occur as a one-time action by the UDM based only on information accessed through LOGMOD, with no reference made to unit-maintained information. Once identified, the UDM enters the ten names into LOGMOD to support continued processing and will notify the selected individuals to report to the unit at a designated time defined for the Experiment DSOE.

With the names entered into LOGMOD, the Manpower and Personnel office will access the names by chalk, generate the travel orders, and deliver the orders to the holding area for distribution as the personnel arrive.

Upon arrival at the unit, the selected ten individuals will be processed as a group. For the processing, the individuals will place their personal bags onto a pallet, and then record their arrival and verify their readiness by scanning their identification cards. Measuring for the experiment will be from the time the first person starts processing with their card until the tenth

one is completed. For the experiment, it will be assumed that no corrective actions will be necessary due to the UDM and Personnel maintaining up-to-date records.

The As-Is baseline personnel processing information will also be collected using the same ten selected individuals. As the ten personnel complete in-processing using the scanner, they will in-processed as a group using the current mobility folder review approach. The timing will be from the start to completion of the folder review.

Transport of personnel from the unit to a holding area will be accomplished on a chalk basis, with the probability that personnel from various units will be included in a chalk. For the experiment, measurement of the transport process will involve the 40 people from the four designated units, with the bus picking the ten individuals from each unit and transporting them to the holding area. The timing will be from the time the bus leaves its base location until the 40 personnel are unloaded at the holding area. Within the holding area, the personnel as a chalk will receive their travel orders and any briefing, with an assumed time of 20 to 30 minutes.

The scanned names will be e-mailed to supply, initiating the building of their mobility bags. As they are completed, supply will place the mobility bags onto pallets in preparation for pallet transport to the marshalling area.

2.5.2.2 Equipment Preparation

Since Mt Home will be conducting a deployment exercise along with the Field Experiment will be performed standard UTC listings will be used, with all items prepared for deployment. This means that the results of the UTC tailoring accomplished in the planning phase discussed above will not fully carry through to the preparation of the deploying cargo. Therefore, the design of the metric collection will account for this difference.

Within the experiment, approximately ten items within the UTC for a selected unit that require periodic maintenance will be identified. Currently, these selections are based mainly on knowledge of unit personnel. The future operational concept will rely more on automated tracking of maintenance status and selection of equipment for deployment. Prior to the

experiment, the maintenance records for the selected items will be collected and organized in a prioritized manner for presentation to support the selection process. During the experiment, the unit will select the items as currently performed. The selection process will then be repeated using the maintenance information simulated from a decision support system that prioritizes like-items for deployment selection.

For the experiment, ten standard increments, preferably from one unit, will be selected for tracking the increment preparation process. The ten increments will include five pallets, three bins, and two pieces of rolling stock. Prior to the experiment, bar codes will be attached to the pallets, bins, and rolling stock as well as the major items that will be packed on the pallets and in the bins. These bar codes will be entered into the scanner database. As the increment is built, the pallet, bin, or rolling stock will be scanned. As each item is placed onto the pallet or bin, it is scanned and related to the increment within the scanning database. Increment and item information collected using the scanner will be uploaded into LOGMOD. With the increment information contained in LOGMOD, the information is transferred within IDS to CMOS for the generation of the load manifest.

2.5.2.3 Marshalling Area

Transport of the increments to the marshalling area will be done by chalk from each unit as currently done from the unit to the CDF. Rolling stock will be pulled or driven, and forklifts will transport pallets and bins. The focus for documenting the transport time will be the ten designated increments, but if possible, additional times will be collected for each individual increment.

At a centralized point near the marshalling area, the increments will be moved through a simulated technology for measuring and weighing, and computing center of balance as necessary. As the weights are collected and entered into the IDS, information is transferred into CALM for the computation of the load plan. Upon arrival at the marshalling area, the increments will be placed in the appropriate chalk area without any additional inspections.

Combining the LOG-AID experiment with the Mt Home exercise will require that the standard UTCs be built, thus preventing an analysis for the reduction in increments due to the reduced deploying resources and the combination of those resources onto fewer increments. As an alternative approach, the results of the tailoring will be computed by comparing the tailored list to the standard list. Based on weight and characteristics of the deploying resources, an estimated number of increments will be computed and compared to the standard number of increments.

For another perspective of the potential increment savings, the weights and measurements of the final increments will be obtained and analyzed. The analysis will identify the number of increments that could have been saved if each increment had been fully loaded.

2.5.3 Loading

The aircraft loading will begin with the cargo and complete with the loading of personnel.

2.5.3.1 Loading of Equipment

Equipment loading will assume the use of ramps for rolling stock and the K-Loader for pallets and bins. The loading of rolling stock will remain as it currently occurs. The loading of pallets and bins will assume the use of a K-Loader positioned at the aircraft and the use of a pallet train to deliver the increments from the marshalling area to the aircraft. The pallet train will be represented using multiple forklifts to maximize the use of the K-Loader, with the final measurement being that the load team inside the aircraft remains busy a high percentage of the time.

2.5.3.2 Loading of Personnel

Personnel will walk as a chalk from the holding area to the aircraft, entering the aircraft with no additional checks.

2.6 Experiment Schedule

As an experiment, the implementation will not require a continuous effort from tasking receipt to aircraft loading as is done for an exercise or real-world deployment. Rather, segments of the

process with well-defined start and stop conditions will be performed and possibly repeated under controlled conditions. Each experiment segment will be performed in three steps consisting of training, a dry run, and the experiment. A proposed experiment schedule, as presented in Figure 10, was developed for the effective use of military and LOG-AID team resources. A final schedule will be developed to correlate with the operational schedules of Mt Home and Cannon AFBs.

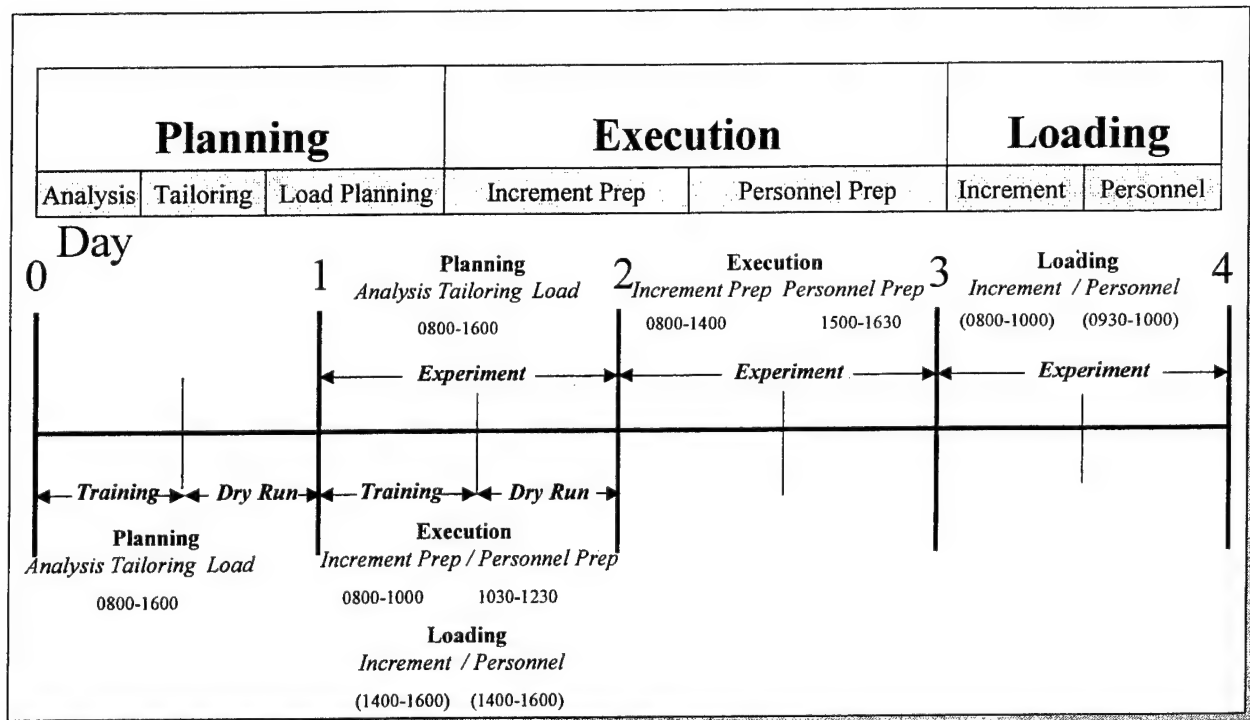


Figure 10. Proposed Experiment Schedule

2.7 Metrics

During the execution of the Field Experiment, metrics will be collected as the basis for evaluating the effectiveness of the individual process changes and tools as well as their impact on the total wing-level deployment process. The evaluation will be performed as five integrated steps, which are the metric definition, data collection material preparation, observer assignment and scheduling, data collection, and data analysis.

2.7.1 Metric Definition

Evaluation of the LOG-AID Field Experiment will be accomplished through the collection of metric data throughout the deployment process. The identification of metrics, the collection of the metric data, and the analysis of the metric data is represented in Figure 11. The shaded activities indicate those already completed or nearly completed.

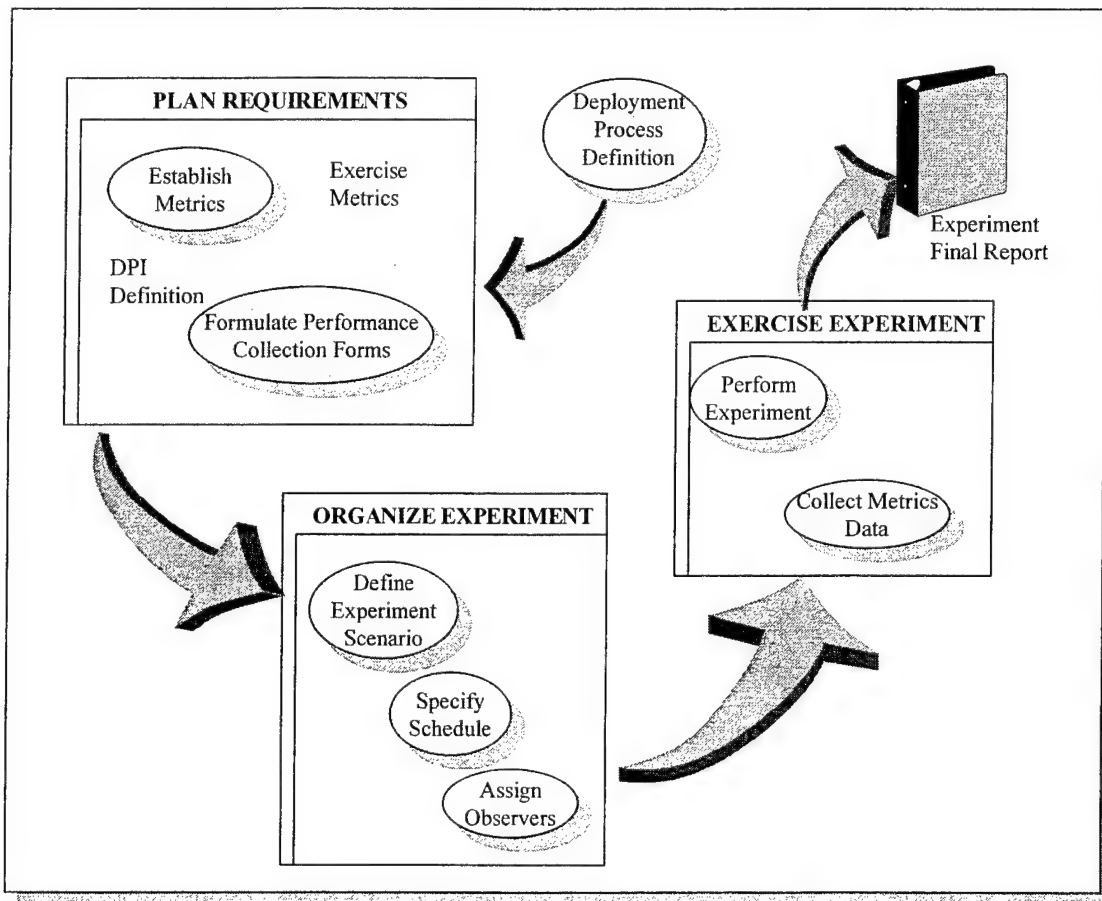


Figure 11. Overview Description of the Metric Identification, Collection, and Analysis

The current deployment process will be modified to the selected improvements and tools. Based on the improved process definition, a set of metrics will be identified for the entire process. In

parallel with this definition, the metrics needed to measure the impacts improvement concept will be identified. To ensure that all the necessary metrics are identified, the DPI metrics will be mapped to the total process metrics, with any additional DPI metrics added to the total process metrics.

With the total process defined for the Field Experiment, the deployment process activities can be separated with respect to the location at which the activities will be performed. From this separation of deployment activities to metric definition, individual recording sheets will be developed to define each metric measurement requirement. Through the scenario, defining the location at which each deployment activity will occur, the assignment of observers to activities will be made along with a schedule for their metric collection.

The improved process definition will be exercised in accordance with the Field Experiment scenario during which the observers will use the recording sheets to collect metrics as guided by their assigned schedule.

The collected metric data will then be analyzed. An initial analysis will be performed using simulated metric data to test the analysis effort. From this some additional metric collection requirements that should be included may be identified, resulting in a cyclic process development until all needed metrics are identified to complete the analysis. Once fully defined, the actual Field Experiment will be exercised and the metric data collected and analyzed as the basis for specifying the effectiveness of the DPIs and the associated tools.

Resulting from integration of the metrics from the activities performed within the total improved process and the metrics required for the improvement concepts is the complete metric set as listed in Table 4 and Table 5.

| Planning Phase | | | | | |
|----------------|--|-----------------|---|--|--|
| Analysis | Activity | Organization | Starting Condition | Completion Condition | Metric Value |
| | Receipt of warning order | Mt Home/IDO | Receipt of warning order | Warning order distributed | Time |
| | Receipt of deployment order | Mt Home/IDO | Receipt of deployment order | Deployment order distributed | Time |
| | Receipt of TPFDD | Mt Home IDO | Notification of TPFDD availability | Receipt of TPFDD by IDO | Time |
| | TPFDD Validation | Mt Home IDO DCC | Receipt of TPFDD by IDO | Completion of validation | Number of UTCs on the TPFDD |
| | Access of Site survey information (EKB on WPAFB server using BCAT) | Mt Home DCC | Time of transfer initiation | Completion of information transfer | Time Number distributed Offices distributed to |
| | Review of the LIMFACS and Shortfalls using BCAT | Mt Home DCC | Start of review of LIMFACS and Shortfalls | Completion of review | Time File size |
| | | | | | Time Number of personnel involved Type of personnel by function |
| Tailoring | Activity | Organization | Starting Condition | Completion Condition | Metric Value |
| | Tailoring within Mt Home using UTC-DT | Mt Home DCC | Time of tailoring initiation | Time of tailoring completion | Time Number of personnel involved Type of personnel by function Comparison of tailoring results (TPFDD) |
| | Coordinated tailoring between Mt Home and Cannon using UTC-DT | Mt Home DCC | Time contact is made to arrange for tailoring | Time at which coordinated tailoring is completed and deployment assignments made | Time Number personnel involved Type of personnel by function Comparison of tailoring results (TPFDD) |

Table 4. Mt Home AFB Page 1 of 5

| Planning Phase (Continued) | | | | | |
|--|------------------|--|---|---|----------|
| Load Planning | | | | | |
| Activity | Organization | Starting Condition | Completion Condition | Metric Value | Observer |
| Prioritization of resources | Mt Home DCC | Completion of tailoring | Completion of prioritization of resources | Time Number of personnel involved Type of personnel by function | |
| Receipt of Airflow | Mt Home DCC | Receipt of Airflow | Dissemination of Airflow | Time Number of personnel who received airflow Type of personnel by function | |
| Chalk assignment | Mt Home DCC | Receipt of Airflow by the appropriate personnel for action | Chalk definition | Time Number of personnel involved Type of personnel by function Number of Chalks | |
| Validation of Airflow | Mt Home DCC | Receipt of Airflow | Chalk definition | Time Number of personnel who validated Airflow Type of personnel by function | |
| Identification of personnel for deployment | Mt Home UDMs | Starting Time for personnel identification (IDS) | All names to spaces complete | Total time Number of personnel involved Number of spaces to fill with names | |
| Identification of equipment for deployment | Mt Home DCC UDMs | Starting time for the equipment identification (IDS) | Final Equipment list | Time Number of personnel involved Number of line items on list | |
| Pre-load plan created using CALM | Mt Home TRANS | Time the pre-load planning is initiated | Time the pre-load plan is completed | Time Number of personnel involved Number of iterations | |
| Development of the initial DSOE | Mt Home IDO DCC | Receipt of the transport assignment and schedule | Completion of the DSOE | Total time Information access time Number of personnel involved Number of systems accessed | |

Table 4. Mt Home AFB Page 2 of 5 (cont'd)

| Execution Phase | | | | | |
|--|------------------------|--|---|--|----------|
| Increment Processing | | | | | |
| Activity | Organization | Starting Condition | Completion Condition | Metric Value | Observer |
| Preparation of increments, both rolling stock (powered and non-powered) pallets and bins | Mt Home UDMs | Completion of the item access list | Completion of the increment buildup | Time Number of personnel involved Skill Level of builders Number of increments Separation rolling stock and pallets Number of items on the increment Weight of each increments Measurement of each increments List of items on each increments | |
| Movement of increments to the marshalling Yard | Mt Home UDMs DCC Trans | Time each increment leaves the unit | Time each increment is positioned in the marshalling yard | Time Number of increments separated by rolling stock (powered/non-powered) bins and pallets | |
| Waiting time for increments in the marshalling yard | Mt Home UDM DCC Trans | Time at which first increment enters marshalling yard | Time at which last increment starts to move to be transported to aircraft | Time Number of people | |
| Personnel Processing | | | | | |
| Activity | Organization | Starting Condition | Completion Condition | Metric Value | Observer |
| Preparation of personnel within the unit using the personnel identification card | Mt Home UDMs | Time of personnel arrival at the unit and process initiation | Personnel ready for transport to holding area | Time Number of persons processing for deployment | |

Table 4. Mt Home AFB Page 3 of 5 (cont'd)

| Execution Phase (Continued) | | | | | |
|--|------------------------|---|---|---|----------|
| Personnel Processing (Continued) | | | | | |
| Activity | Organization | Starting Condition | Completion Condition | Metric Value | Observer |
| Preparation of personnel within the unit Not using the personnel identification card | Mt Home UDMs | Time of personnel arrival at the unit and process initiation | Personnel ready for transport to holding area | Time Number of persons processing for deployment | |
| Mobility Bag Prep at supply | Mt Home SUPS | Names of deploying personnel received at supply | Time that all mobility bags are placed on the pallet | Time Number of bags prepared Number of people involved | |
| Waiting time for personnel in holding area | Mt Home | Arrival time of first person in holding area | Time at which last person is loaded for transport to aircraft | Time Number of people | |
| Loading Phase | | | | | |
| Increments | | | | | |
| Activity | Organization | Starting Condition | Completion Condition | Metric Value | Observer |
| Transport of increments from the marshalling yard to aircraft | Mt Home CDF | Selection of the increment for loading, with the transport vehicle at the increment | Position to aircraft | Time Number of K loaders used Number of Forklift used Number of technology transfers Number of Tow vehicles | |
| Loading of increments into aircraft | Mt Home CDF Loadmaster | Increments position to aircraft | Load Complete | Per cent busy of the load team Speed of aircraft loading | |
| Personnel | | | | | |
| Activity | Organization | Starting Condition | Completion Condition | Metric Value | Observer |
| Transport of personnel to aircraft | Mt Home TRANS | Time transport left holding area | Time at which transport arrives at aircraft | Time | |
| Loading of personnel on aircraft | Mt Home TRANS | Time people left Transport | Time all PAX are loaded on aircraft | Time | |

Table 4. Mt Home AFB Page 4 of 5 (cont'd)

| Planning Phase | | | | | | |
|--|----------------|---|--|------|--|----------|
| Analysis | | | | | | |
| Activity | Organization | Starting Condition | Completion Condition | Time | Metric Value | Observer |
| Receipt of warning order | Cannon/IDO | Receipt of warning order | Warning order distributed | Time | | |
| Receipt of deployment order | Cannon/IDO | Receipt of deployment order | Deployment orders distributed | Time | | |
| Receipt of TPFDD | Cannon/IDO | Notification of TPFDD availability | Receipt of TPFDD by IDO | Time | | |
| TPFDD Validation | Cannon IDO DCC | Receipt of TPFDD by IDO | Completion of validation | Time | Number of UTCs on the TPFDD | |
| Access of Site survey information (EKB on WPAFB server using BCAT) | Cannon DCC | Time of transfer initiation | Completion of information transfer | Time | Number distributed Offices distributed to | |
| Review of the LIMFACS and Shortfalls using BCAT | Cannon DCC | Start of review of LIMFACS and Shortfalls | Completion of review | Time | File size | |
| Tailoring | | | | | | |
| Tailoring within Mt Home using UTC-DT | Cannon DCC | Time of tailoring initiation | Time of tailoring completion | Time | Number of personnel involved Type of personnel by function Comparison of tailoring results (TPFDD) | Observer |
| Coordinated tailoring between Mt Home and Cannon using UTC-DT | Cannon DCC | Time contact is made to arrange for tailoring | Time at which coordinated tailoring is completed and deployment assignments made | Time | Number personnel involved Type of personnel by function Comparison of tailoring results (TPFDD) | |

Table 4. Mt Home AFB Page 5 of 5 (cont'd)

| Activity | Organization | Starting Condition | Completion Condition | Metric Value | Observer |
|---|---------------------------|--|--|--|----------|
| Receipt of TPFDD | Cannon Wing/CC | Notification of TPFDD availability | Receipt of TPFDD by the IDO | Time Lines on the TPFDD | |
| TPFDD Validation | Cannon IDO DCC | Receipt of TPFDD by IDO | Completion of validation | Time Number distributed Offices distributed to | |
| Access of Site survey information from EKB on WPAFB server using BCAT | Cannon LSS/DCC | Time of transfer initiation | Completion of information arrival at Cannon | Time File size | |
| Review of the LIMFACS and shortfalls using BCAT | Cannon LSS/DCC | Start of review of LIMFACS and shortfalls | Completion of review | Time Number of personnel Type of personnel by function | |
| Tailoring within Cannon using UTC- DT | Cannon LSS/LGLX DCC | Time of tailoring initiation | Time of tailoring completion | Time Number of personnel Type of personnel by function Comparison of tailoring results (TPFDD) | |
| Coordinated tailoring between Mt Home and Cannon using UTC- DT | Cannon LSS/LGLX DCC | Time contact is made to arrange for tailoring | Time at which coordinated tailoring is completed and deployment assignments made | Time Personnel involved Type of personnel by function Comparison of tailoring results (TPFDD) | |

Table 5. Cannon AFB

The number of observers needed for data collection is driven by the location and sequencing of the activities for which metrics will be collected. Mt Home AFB and Cannon AFB will participate in the planning portion of the experiment, and Mt Home will complete the Field Experiment by preparing and processing the resources identified for deployment. Therefore, joint observer teams will then be positioned simultaneously at Mt Home and Cannon for the planning phase, with the final set of observers positioned at Mt Home for the resource preparation and processing. The right-hand columns of Table 4 and Table 5 relate the observers to the activities. This relationship determines the number of observers required and their assignments. As the LOG-AID Field Experiment schedule is formulated, the observer schedule will also be formulated.

2.7.2 Data Collection Material Preparation

For each activity identified in Table 4 and Table 5, a data collection form will provide the observer with the information needed to collect the necessary information. The form, as illustrated in Figure 12, defines the activity along with its starting and ending conditions, and lists the metrics to be collected and the resources needed by the observer to perform the metric collection for the action.

| Receipt of Warning Order LOG-AID Experiment | | | |
|---|-------------------------------------|----------------|----------------|
| Location/Office | Date/Time | Observer | Control Number |
| Mt Home/ IDO | TBD | | 0110 |
| TASK: To observe and record the receipt time of the warning order RESOURCES NEEDED: Watch, LOG-AID experiment work sheet, clipboard, and pen or pencil | | | |
| Conditions | Descriptor | Observer Input | |
| Starting Time | Receipt of warning order by Mt Home | (Date/Time) | |
| Completion Time | Warning order distributed | (Date/Time) | |
| OBSERVATIONS: Record any discrepancies, improvement areas and workarounds that might have taken place as part of this task. | | | |

Figure 12. Metric Collection Form

2.7.3 Data Analysis

Analysis of the collected metric values will be directed at rating the value of the improvement concepts incorporated into the wing-level deployment process, with the results being published

in the final report. In general, the improvements will be measured in terms of the processing time, reduction in footprint, the number of augmentees used and their level of workload. The analysis will not only consider the overall improvements to the process resulting from combination of the DPIs, but will also isolate the impact that each DPI has on the total process or segments of the process. From the analysis will be identified those DPIs providing the benefits that justify continued research and development.

The foundation for the analysis will be the baseline deployment processing information collected at Mt Home and Cannon AFBs. Against this foundation will be the process performance information collected during the Field Experiment. The initial analysis will result from the comparison between the baseline and the experimental data to identify the benefits specifically received by the two sites.

However, deployment process implementations vary among the many AFBs, as does the level of technologies used to implement the process. Therefore, a secondary analysis will be performed to formulate a more global view for the impact of the proposed improvements on the overall Air Force wing-level deployment capabilities. The basis for the secondary analysis will be the process performance information collected from numerous bases as part of the LOG-AID Phase I effort and integrated into a generic view of the wing-level deployment process.